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Non-Proliferation of Nuclear Weapons

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ACTIVITIES OF THE INTERNATIONAL ATOMIC ENERGY AGENCY RELEVANT TO ARTICLE III OF THE TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS

Background Paper Prepared by the Secretariat of the IAEA

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ARTICLE III OF THE NPT

"1. Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfilment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this Article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this Article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere."

"2. Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article."

"3. The safeguards required by this Article shall be implemented in a manner designed to comply with Article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international co-operation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this Article and the principle of safeguarding set forth in the Preamble of the Treaty."

"4. Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this Article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of this Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than the date of such deposit. Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations."

Activities of the International Atomic Energy Agency Relevant to Article III of the Treaty on the Non-Proliferation of Nuclear Weapons

EXECUTIVE SUMMARY

1. States Party to the NPT rely on the IAEA to provide assurance of the compliance of other States Parties with their safeguards undertakings and to demonstrate their own compliance. The provision of such assurance through IAEA safeguards promotes further confidence among States and, as a fundamental element of the NPT, helps to strengthen States' collective security. Safeguards and other Agency activities related to nuclear material security also facilitate international nuclear trade and co-operation. For the last thirty years, the Agency has been able to provide credible assurance about the non-diversion of nuclear material which has been declared and placed under safeguards.

2. Safeguards have continually evolved, since their inception, to take account of changes in technology. Following the Gulf War, the shortcomings of the safeguards system became apparent and it was agreed that the system would have to provide assurance not only about the non-diversion of declared nuclear material and facilities but also about the absence of any undeclared nuclear material and activities. To do this, the system has needed to move beyond its traditional focus on nuclear material accountancy - essentially a quantitative audit system designed to keep track of material declared to the Agency - to a system based on more qualitative assessment. Such a system affords the Agency a better vantage point from which to develop a more comprehensive picture than before of all nuclear activities in a State and to detect and verify possible non-peaceful activities at an early stage. The strengthening of Agency safeguards has entailed developments in three major areas: more information, wider access and greater use of advanced technology.

3. The IAEA began to introduce new measures to strengthen safeguards in 1992. Some of the measures could be carried out by virtue of the authority conferred upon the IAEA in existing comprehensive safeguards agreements. Other measures required additional authority which was conferred upon the Agency through the Model Protocol Additional to safeguards agreements ("Model Additional Protocol") approved by the IAEA Board of Governors in May 1997 (INFCIRC/540 Corr.). The measures in the Model Additional Protocol are designed to provide the Agency with as comprehensive a picture as is practicable about a State's nuclear material and activities and additional physical access to places where nuclear material is, or could be, present. The underlying rationale is that the more that is known about a State's nuclear activities and plans, the more comprehensive the verification process can be and the more robust the assurances derived therefrom.

4. The 1995 NPT Review and Extension Conference adopted a number of "Principles and Objectives" relating to Agency safeguards. In paragraph 9 of that document, the States Parties confirmed that the IAEA is the competent authority to verify and assure States' compliance with their safeguards agreements. The IAEA has continued to function as such. Paragraph 10 of the same document notes that all States Parties are required to bring into force comprehensive safeguards agreements. Since the 1995 Conference, 28 States Parties to the Treaty have concluded and brought into force safeguards agreements which satisfy the requirements of the NPT, bringing the total number of States with Treaty safeguards

agreements in force to 127 as of 1 January 2000. However, there remain 55 States Parties which have not yet brought into force the safeguards agreement which the Treaty requires of them.

5. Paragraph 11 of the "Principles and Objectives" supported strengthening the effectiveness of the safeguards system. Given the importance attributed in that paragraph to supporting and implementing decisions adopted by the Board of Governors aimed at further strengthening the effectiveness of safeguards, progress in concluding Additional Protocols has been disappointingly slow. In this context, it is important to note that the Agency's ability to implement fully the safeguards required by Article III of the Treaty depends not only on all the relevant safeguards agreements being in place, but also on the conclusion of Additional Protocols. This is because it is only with respect to States which have both a comprehensive safeguards agreement and an Additional Protocol that the Agency will be able to provide credible assurances about the non-diversion of nuclear material and the absence of undeclared nuclear material and activities.

6. Paragraph 13 of the "Principles and Objectives" stated that fissile material transferred from military use to peaceful nuclear activities should, as soon as practicable, be placed under IAEA safeguards in the framework of the Voluntary Offer safeguards agreements in place with the nuclear-weapon States (NWSs). Ten tonnes of highly enriched uranium and two tonnes of plutonium are currently under safeguards in the United States of America. In addition, the Agency is making arrangements for the down-blending of some 50 tonnes of high enriched uranium deemed excess by the USA. The United Kingdom has also reduced its nuclear stockpile and has released significant fissile material inventories from military use. This material is now subject to EURATOM safeguards and is eligible for IAEA safeguards under the United Kingdom's Voluntary Offer Agreement, contingent on adequate resources.

7. Over and above these efforts, in September 1996, the United States of America and the Russian Federation launched a joint initiative concerning Agency verification of weapon-origin fissile material in the USA and the Russian Federation. The Parties are addressing the various technical, legal and financial issues involved and work is ongoing with regard to a framework verification agreement which would ensure that the fissile material is irrevocably removed from weapons programmes, and verification arrangements which would enable the Agency to draw independent and credible conclusions, while ensuring, in line with the States' obligations under Article I of the Treaty, that no classified information could be acquired by the inspectors.

8. In paragraph 19 of the "Principles and Objectives", the States Parties agreed that every effort should be made to ensure that the IAEA has the financial and human resources to meet its safeguards responsibilities effectively. Notwithstanding, IAEA Member States have continued to apply a policy of zero real growth to the IAEA's budget. The Agency has become increasingly dependent on voluntary, extrabudgetary contributions from Member States. In the projected budget for 2001, over 20% of the full cost of the safeguards programme lies outside the regular budget. Such heavy reliance on extrabudgetary funds is unsound and unsatisfactory.

9. Important aspects of IAEA safeguards since 1995 are the Agency's activities in Iraq and in the Democratic People's Republic of Korea (DPRK). From 1995 to 1998, the IAEA

continued monitoring and verification activities in Iraq pursuant to the relevant Security Council resolutions. Restrictions of rights imposed by Iraq on IAEA teams in the second half of 1998 resulted in a severely limited level of assurance about Iraq's compliance with the Security Council resolutions. On 16 December 1998, monitoring activities were suspended indefinitely. In January 2000 the Agency carried out an inspection pursuant to Iraq's NPT safeguards agreement.

10. The Agency is still unable to verify the initial report of nuclear material and facilities subject to safeguards in the DPRK and can accordingly provide no assurance about non-diversion. The DPRK remains in non-compliance with its safeguards agreement. It continues to link the extent of its co-operation with the Agency to progress in the implementation of the Agreed Framework between the DPRK and the United States of America.

11. The Agency has been involved in a variety of other safeguards-related issues since the 1995 NPT Review and Extension Conference. Progress was made in the conclusion of safeguards agreements related to nuclear-weapon-free zones (NWFZs). Efforts also continue with regard to the application of full-scope IAEA safeguards to all nuclear activities in the Middle East and a future NWFZ in that area. The Agency has also increased its efforts with regard to the security of nuclear material, for example through improving its database of illicit trafficking incidents. The recommendations for physical protection, published under IAEA auspices, were reviewed and strengthened in 1998.

12. The Agency has continued to devote substantial effort to strengthening the effectiveness and improving the efficiency of safeguards. One measure of effectiveness is inspection goal attainment. This has continued to improve gradually since 1995 but efforts are still required to solve some implementation problems. The efficiency of safeguards has also continued to improve. Efficiency, as measured by the cost of safeguards per significant quantity (SQ) of nuclear material, has been improved due largely to economies of scale. The implementation of the Additional Protocol is expected to increase further both the effectiveness and the efficiency of Agency safeguards.

13. Throughout the past five years, the Agency has continued to respect its obligations to: avoid hampering and undue interference in States' peaceful nuclear activities; protect commercial and industrial secrets and other confidential information; secure staff of the highest standards with due regard to geographical distribution; co-operate with State Systems of Accounting and Control; increase the transparency of safeguards; and provide effective and acceptable safeguards approaches for new and complex nuclear facilities.

14. The main focus of the on-going and future work is merging the existing nuclear material verification activities with the new strengthening measures or, in other words, the integration of safeguards. The aim is to optimize the combination of all the safeguards measures available to the Agency in order to meet the Agency's safeguards objectives with maximum effectiveness and efficiency.

15. States should provide all the necessary political, technical and financial support for all safeguards-related work of the IAEA. States can make a major contribution in a variety of ways, for example through supporting and implementing safeguards strengthening measures. Of key importance in this context is the conclusion of safeguards agreements and

Additional Protocols. States can also contribute to the Agency's safeguards work through: safeguards support programmes; timely, positive responses to inspector designation proposals and visa requests; the provision of logistical and other support; and ensuring high quality in their material accountancy data and declarations submitted pursuant to Additional Protocols.

I. SAFEGUARDS UNDER THE NPT

A. Safeguards as a Component of the Non-Proliferation Regime

16. Safeguards applied in accordance with Article III of the NPT are a form of institutionalized nuclear transparency through which the IAEA can verify that a non-nuclear-weapon State's nuclear activities are being used exclusively for peaceful purposes. However, IAEA safeguards are only one component of a wider set of measures designed to give assurance against the proliferation of nuclear weapons. They are directly connected to the legal instruments, such as the NPT, in which non-proliferation commitments are anchored and to the mechanisms for ensuring compliance, such as recourse to the Security Council. Other major component of the regime are: (i) national legislation and regulations aimed at preventing the proliferation of nuclear weapons; (ii) national and international nuclear export control systems; (iii) measures to ensure the physical protection of nuclear material and to guard against theft or unauthorized use; (iv) commitments not to test nuclear weapons or other nuclear explosive devices; and, most importantly, (v) regional accommodations (as reflected, inter alia, in nuclear-weapon-free zone (NWFZ) treaties) and steps towards nuclear disarmament. All of these components are mutually reinforcing.

17. The basic authority for the IAEA to apply safeguards derives from the provisions of the Statute of the IAEA, which entered into force in 1957. Article III.A.5 of the Statute authorises the Agency, inter alia, "to apply safeguards, at the request of the Parties, to any bilateral or multilateral arrangement".

18. With the entry into force in 1970 of the NPT, the IAEA was vested with the responsibility of assuring, through its safeguards system, compliance by non-nuclear-weapon States (NNWSs) Party to the Treaty with their safeguards obligations under the Treaty. In 1972, the Board of Governors approved the structure and content of a model comprehensive safeguards agreement pursuant to the NPT and requested the Director General to use it as a basis for negotiating safeguards agreements under the NPT. The relevant document (IAEA document INFCIRC/153 (Corr.)) is also regarded as the standard guideline for safeguards agreements under NWFZ treaties and other non-proliferation undertakings (e.g. the safeguards agreement concluded at the request of Argentina and Brazil). In addition, the five nuclear-weapon States (NWSs) have each accepted the application of Agency safeguards to all or part of their peaceful nuclear activities along the lines of INFCIRC/153 (the so called "Voluntary Offer Agreements").

B. Objectives of Safeguards

19. The objectives of NPT safeguards are to ensure that safeguards are applied to all nuclear material in all peaceful nuclear activities of the NNWSs Parties to the Treaty and to assure the international community that NNWSs Parties are complying with their peaceful use undertakings. The Agency endeavours to fulfil these objectives through a system that is

designed to detect, in a timely manner, a diversion of significant quantities (SQ)[1] of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices and to deter such diversion by the risk of early detection. The system is based on the principle that a certain quantity of nuclear material is needed to manufacture a nuclear explosive device and that a certain length of time is required to convert that material into weapons-usable form.

C. Basic Features

20. The basic features of the original NPT safeguards system are: *nuclear material accounting* through which, on the basis of information provided primarily by the State, the Agency establishes an initial inventory of nuclear material in the State, and records subsequent changes to it; *containment and surveillance* measures to monitor access to and movement of nuclear material and *on-site inspections* during which Agency inspectors have the right and obligation to carry out a variety of measures (such as the examination of records; taking measurements and samples of nuclear material for IAEA analysis; and verifying the functioning and calibration of instruments) for the purpose of verifying the correctness of States' nuclear accountancy data and also the completeness of declarations related to their nuclear programmes. On-site inspection is its most important feature. Inspections are of three types: ad hoc, routine and special. Ad hoc and routine inspections constitute the bulk of inspections. They give the Agency access to nuclear material and operating records and to specified locations where nuclear material is or may be used or stored. Special inspections are exceptional and may be prompted by the State itself, or by the IAEA if it considers that information made available by the State is not adequate for the Agency to fulfil its responsibilities under the relevant safeguards agreement.

21. The safeguards system is based on impartiality and objectivity and assumes neither compliance nor non-compliance. Essentially an audit system, it can neither provide assurances about future compliance or intentions, nor ensure enforcement. Rather, in cases where the system functions as an alarm which can trigger other response mechanisms.

D. Strengthening Safeguards

22. The Background Paper which the IAEA prepared for the 1995 NPT Review and Extension Conference (NPT/CONF.1995/7) about its activities under Article III of the NPT made clear that, following the discovery of Iraq's clandestine enrichment and nuclear weapons programmes, the Agency embarked upon intensive efforts to strengthen its safeguards system. The aim has been to develop a system which can not only provide assurance about the non-diversion of **declared** nuclear material and facilities, but can also provide credible assurance about the absence of any **undeclared** nuclear material and activities. The 1995 Background Paper explained that the focus of these efforts has been on obtaining more information from States about their nuclear activities and plans, and on

[1] A significant quantity is the approximate quantity of any given type of nuclear material which, taking into account any conversion process involved, is required for the manufacture of a nuclear explosive device. The timely detection of diversion is a reference to the maximum time frame within which the Agency seeks to detect any diversion from peaceful use. For this quantification, the Agency looks at the "conversion times" required to convert different types of nuclear material into a nuclear explosive device.

greater access to locations at which nuclear material is or could be present. Early strengthening measures were described (such as the early provision of design information about nuclear facilities, a reporting scheme on imports and exports of nuclear material and certain non-nuclear material and equipment, and the affirmation by the IAEA Board of Governors of the Agency's right to conduct special inspections), and considerable coverage was given to the then on-going safeguards development programme ("Programme 93+2") designed to build on earlier measures to strengthen the Agency's information base about a State's nuclear material and activities and to provide for greater access. The paper explained that increased cost efficiency was also a focus of the Programme.

23. As foreseen at the time of the 1995 NPT Review and Extension Conference, the Director General of the IAEA submitted to the IAEA Board of Governors, shortly thereafter, a number of proposals for further strengthening measures. Some of the proposals could be carried out under the authority already contained in comprehensive safeguards agreements. Others required additional authority to be conferred by States upon the Agency. Measures in the former category, which were brought to the attention of the IAEA Board of Governors in June 1995, built on earlier ones through recourse to such information gathering techniques as environmental sampling, the use of remote monitoring equipment, and improved evaluation of all information available about a State's nuclear material and activities.

24. In June 1996, the Board of Governors decided to establish an open-ended Committee to negotiate a legal instrument that would provide the legal authority for certain other measures which did not fall within the existing legal authority. The Committee met four times (2-4 July and 1-11 October 1996; 20-31 January and 2-4 April 1997) and negotiated the text of the Model Protocol Additional to Safeguards Agreements ("Model Additional Protocol") which was approved at a special meeting of the Board of Governors in May 1997. The document is published as an Agency Information Circular, INFCIRC/540 (Corrected).

25. The Model Additional Protocol embodies powerful new tools to help the Agency to verify compliance with States' nuclear non-proliferation commitments and, in combination with the relevant safeguards agreement, provides for as complete a picture as practicable about: a State's production of and holdings of nuclear source material; activities for the further processing of nuclear material (whether for nuclear or non-nuclear use); and elements of the infrastructure which supports the States' current or planned nuclear fuel cycle. The voluntary reporting scheme mentioned in paragraph 22 above is in substance incorporated into the Additional Protocol as a legal obligation.

26. A NNWS which has concluded an Additional Protocol is obliged to provide the Agency with:

(a) information about, and inspector access to, all aspects of the State's nuclear fuel cycle, from uranium mines to nuclear waste and any other locations where nuclear material is present;

(b) information about, and access mechanisms related to, nuclear fuel cycle-related research and development;

(c) information about, and short-notice inspector access to, all buildings on a nuclear "site";

(d) information about the manufacture of nuclear-related items and also any exports of sensitive nuclear-related technologies, and mechanisms for physical access to relevant locations in this regard;

(e) information about a State's long-term plans for the development of the nuclear fuel cycle;

(f) wider physical access than hitherto for inspection purposes and for the collection of environmental samples.

Provision is also made for:

(g) administrative arrangements, to rationalize safeguards administration through improving the process of inspector designations, the issuance of visas, wider use of IAEA regional offices, and enabling Agency inspectors to use the most up to date means of communications for transmitting safeguards-related data in a timely fashion.

27. The Model Additional Protocol represents a balance between rights and obligations of States and the Agency. While a State concluding an Additional Protocol incurs certain additional, legal obligations, the other side of the coin is that States' rights are protected under the Model Additional Protocol through the Agency's obligation to:

(a) ensure that the broader access rights incorporated in the Model document are not applied in any mechanistic or systematic fashion, but on a selective basis to facilities or to other places where nuclear material is declared to be present (to assure the absence of any undeclared nuclear material or activities) and to resolve questions and inconsistencies;

(b) provide advance notice to the State in writing of requests for such access, referred to in the Additional Protocol as "complementary access", specifying the reasons for the request and the activities to be carried out;

(c) accept managed access upon request by the State, in order to prevent the dissemination of proliferation sensitive information or to protect proprietary or commercially sensitive information;

(d) hold prior consultations with the State, for example, to give the State an opportunity to clarify and facilitate the resolution of a question or inconsistency, before a request for complementary access is made, or, in connection with wide-area environmental sampling, as and when such environmental sampling is approved by the Agency's Board of Governors;

(e) inform the State in writing of the activities and results of activities carried out under the Additional Protocol and the conclusions it has drawn therefrom;

(f) agree on Subsidiary Arrangements with the State, if either the State or the Agency considers it necessary to specify in Subsidiary Arrangements how measures laid down in the Additional Protocol are to be applied; and

(g) maintain a stringent regime to ensure effective protection against disclosure of all commercial, technological and industrial secrets and other confidential information coming to the Agency's knowledge in the implementation of the Additional Protocol.

Moreover, the enhanced assurances about the peaceful nature of States' nuclear activities and compliance with their non-proliferation undertakings, which the Agency will be able to provide as a result of its implementation of the Additional Protocol, will benefit the States that are Party to it.

28. Following the adoption of the Model Additional Protocol by the Board of Governors in May 1997, the IAEA Secretariat began work on the infrastructure necessary for effective and efficient implementation. Guidelines for States on the information required under Article 2, and formats for providing it, were developed. Model language has also been formulated for use in Subsidiary Arrangements. Recently, specific guidelines were completed to take account of the particular circumstances of States which, according to the Secretariat's understanding, have little or no nuclear material or activities. Work continues on guidelines for complementary access - of considerable interest to States during the Board's Committee deliberations - and, very importantly, training courses continue to be designed or modified to equip Agency inspectors with the new skills they need with the shift, under the Additional Protocol, to a more qualitative type of assessment. Also important are all the measures which the Agency continues to take to enhance its information gathering, analysis and evaluation capabilities.

II. DECISIONS OF THE 1995 NPT REVIEW AND EXTENSION CONFERENCE WITH REGARDS TO SAFEGUARDS

29. In keeping with the mandate conferred by the Third Session of the Preparatory Committee for the 2000 NPT Review Conference, this paper focuses on the implementation of the outcome of the 1995 Review and Extension Conference in so far as relevant to Agency safeguards.

30. The 1995 NPT Review and Extension Conference adopted a number of "Principles and Objectives" relating to Agency safeguards. These are listed in Annex 1. The following commentary summarizes the progress made to date in the implementation of those Principles and Objectives.

III. IMPLEMENTATION OF THE 1995 CONFERENCE PRINCIPLES AND OBJECTIVES REGARDING IAEA SAFEGUARDS

A. IAEA as Competent Safeguards Authority

31. The IAEA has continued to function as the competent authority to verify and assure, in accordance with its Statute and its safeguards system, compliance with the safeguards agreements with States Parties in fulfilment of their obligations under Article III.1 of the Treaty.

B. Progress in the Entry into Force of Safeguards Agreements pursuant to the NPT

32. Annex 2 gives details about increases in the number of safeguards agreements in force with the Agency. Since 1 January 1995, 28 States Parties to the Treaty have brought into force safeguards agreements which satisfy the requirements of the NPT, bringing the total number of States with NPT safeguards agreements in force to 127 as of 1 January 2000. There are still 55 States Parties which have not yet met their obligation under the NPT to conclude a comprehensive safeguards agreement. None of them will have met the Article III.4 obligation for the entry into force of the required agreement within 18 months of becoming a Party to the NPT.

33. Annex 3 to this paper shows lists of States which have NPT safeguards agreements in force with the Agency, and States whose safeguards agreements have still not entered into force, despite promptings by the Agency.

C. Strengthening the Effectiveness of IAEA Safeguards

1. Measures within the Authority Conferred by Safeguards Agreements

34. Based on courses of action endorsed by the Board of Governors in 1992 and 1995, the Agency has conducted the following activities to strengthen its safeguards system consistent with the legal authority provided under INFCIRC/153.

Increased Access to Information from States

35. As described in paragraph 22 above, the strengthening measures introduced by the Agency prior to the 1995 Conference included: the early reporting of design information for new facilities and for modifications to existing facilities; simplified inspector designation procedures; and voluntary reporting of nuclear exports and imports and of specified non-nuclear material and equipment. To date, 44 of 49 States have responded and provided relevant information on new and modified facilities, and for these States Subsidiary Arrangements to safeguards agreements have been amended accordingly. Apart from the 8 States for which an Additional Protocol is in force, 27 States have agreed to simplified inspector designation procedures and 41 States and the European Atomic Energy Community (EURATOM) have contributed to the voluntarily reporting on imports and exports of nuclear material, and of certain specified equipment and non-nuclear material used in nuclear applications.

36. In response to Agency requests, 37 States have provided information on facilities and locations outside facilities that were closed down or decommissioned prior to entry into force of their safeguards agreements.

37. Descriptions of the nuclear fuel cycle, and other activities involving nuclear material have been received from 40 States. In cases where the relevant information has been provided, the IAEA has obtained greater clarity about the relevant States' nuclear programmes. This has facilitated the planning of verification activities and the subsequent interpretation of the results.

Environmental Sampling

38. Since the 1995 Conference and in the context of gathering further information about a State's nuclear activities, the Agency has carried out initial *environmental sampling*, to serve as a reference point for subsequent routine sampling at 12 of the 14 enrichment plants under safeguards. The analytical results of the samples taken gave technical indications of the nuclear activities performed at the relevant facilities, thus contributing significantly to the Agency's confidence about the absence of undeclared production of high enriched uranium at these facilities. The Agency has also carried out (up to the end of 1999) initial environmental sampling at 77 research installations with large hot cells in 40 States. For hot cells, environmental sampling results may confirm the declared activities, thereby providing increased assurance of the absence of undeclared activities, including undeclared reprocessing operations or ongoing operations in shut-down facilities.

Information about State Systems of Accounting and Control (SSAC)

39. Since 1995, the Agency requested States and other Parties to comprehensive safeguards agreements to provide information about: their State Systems of Accounting and Control (SSAC); closed-down and decommissioned facilities and locations outside facilities; their nuclear fuel cycle activities involving nuclear material; and planned nuclear facilities.

40. The Agency has received the SSAC information it had requested from most States with significant nuclear activities, from EURATOM and from the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC). This information provides a basis for enhanced co-operation that could, inter alia, improve IAEA safeguards efficiency while preserving the requirement for the Agency to be able to draw its own, independent safeguards conclusions.

41. Based on the information provided by them, the Agency has started discussions with States and regional systems to identify areas where co-operation could be enhanced, taking into account the characteristics of the specific SSAC or regional system. Potential areas of enhanced co-operation are: (1) common safeguards training for IAEA and SSAC personnel; (2) joint safeguards equipment research, development and procurement; (3) common use of safeguards equipment by the IAEA and the relevant SSAC; and (4) the joint conduct of selected inspections.

Improved Analysis of Information

42. A system for the collection of information from open sources has been established by the Agency to supplement the safeguards information available within the IAEA Secretariat about States' nuclear and nuclear-related activities. Information from open sources contributes significantly to the knowledge about a State's nuclear programme and enhances the Agency's ability to verify that States declarations are correct and complete. The specialized software which is necessary to retrieve and handle the large amount of information available from open sources is available and in regular use.

43. As a corollary to its efforts to obtain further information about a State's nuclear activities and plans, the Agency has been seeking to enhance its capability to evaluate effectively that information. In 1996, an Information Review Committee, involving senior Agency management, was established to oversee the evaluation of information for each State. In 1997, the Agency began regular evaluations of all information available to it about States' nuclear programmes. These evaluations were followed up, where necessary, to clarify States' nuclear programmes and plans. The reviews are more comprehensive in cases where the State in question has not only concluded a safeguards agreement with the Agency, but has also an Additional Protocol in force, and has accordingly submitted the information required under the Protocol.

Short Notice Inspections

44. The Agency has been seeking to expand the use of its right under safeguards agreements to conduct a portion of routine inspections "without advance notification" i.e. at short notice. This is being developed in conjunction with Member States. Field tests have demonstrated the feasibility of such arrangements for verifying nuclear material flow. It is anticipated that recourse to such inspections could contribute towards eventual reduction in other safeguards activities in the field.

Advances in Safeguards Technology

45. The Agency has introduced the use of advanced technology in measurement and surveillance equipment, thereby improving safeguards effectiveness and efficiency. When the new equipment is operated in an unattended mode, it should be possible to reduce the frequency of inspections. Additionally, having completed field testing of new digital surveillance systems, the Agency has started replacing the older, analogue systems which have been shown to be less reliable and which require greater maintenance. By the end of 1999, 118 digital systems were in operation. In addition, in the Member States of EURATOM, 77 digital surveillance systems had been installed by the European Commission for joint use with the Agency.

46. Progress has been made in introducing the remote transmission of safeguards data. A number of successful field trials demonstrated the feasibility of monitoring certain safeguards relevant operations by remote means. By the end of 1999, remote monitoring was being implemented at 8 facilities in 5 States. The continued rate of implementation will depend on the availability of the necessary resources and on the cost-effectiveness of the remote monitoring, which depends on such factors as the type of facility, the verification approach and the location of the particular facility.

2. Progress with regard to Additional Protocols

47. As noted in paragraphs 24 to 28 above, the basis for strengthening the IAEA safeguards system, particularly with regard to the Agency's ability to detect undeclared nuclear material and activities, was laid by the Board of Governors approval of the Model Additional Protocol in May 1997.

48. The IAEA Secretariat has been seeking since then to urge all States to conclude Protocols Additional to their respective safeguards agreements. This would be a further manifestation of their nuclear non-proliferation commitments and more importantly would enable the Agency to implement fully its obligations under Article III. As of 1 January 2000, the Board of Governors had approved Additional Protocols with 46 States Parties, including the 15 Member States of the European Union. Of these, 8 had entered into force[2] and a further one was being applied provisionally[3] (see Annex 4). Consultations are proceeding with a number of other States. In this regard, it is disappointing that, despite frequent calls upon them to do so, fewer than one third of the States Party to the NPT have responded to the calls of the Board of Governors on strengthening safeguards with regard to the conclusion of Additional Protocols.

49. As previously stated, Additional Protocols build on other, key strengthening measures by further increasing Agency access to information about States' nuclear and nuclear fuel cycle related activities and also by making provision for increased access to locations in States where nuclear material could be present. Where a State has both a safeguards agreement and an Additional Protocol in force, it provides for the optimum combination of measures through which the Agency can provide enhanced assurance of both the non-diversion of nuclear material and of the absence of undeclared nuclear material and activities.

50. As a starting point, a State is required to submit information under Article 2 of its Additional Protocol and periodic updates of that information as prescribed in Article 3. These "expanded declarations" seek information, additional to that already given under the safeguards agreement, in order to achieve as complete a picture as is practicable about the State's nuclear material and programmes. The document contains provisions which enable the Agency to request subsequent amplifications or clarifications to the information provided. Additionally, if other sources of information available to the Agency appear to be at variance with the State's declarations, the Agency may seek additional information and/or request "complementary access" to the relevant location(s) in the State to help resolve any question or inconsistency which it has identified and has brought to the attention of the State. States are entitled to receive advance notice of all complementary access visits as specified in the Additional Protocol.

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[2] Australia, Holy See, Indonesia, Japan, Jordan, Monaco, New Zealand, Uzbekistan

[3] Ghana

51. By 31 December 1999, the Agency had received information pursuant to Article 2 from 6 States with Additional Protocols in force.

52. The safeguards development programme initially known as "Programme 93+2" was conceived against the backdrop of undeclared nuclear activities in a State with a comprehensive safeguards agreement with the IAEA. It was nevertheless recognized early on in the Programme that the implementation of certain safeguards strengthening measures in other States (i.e. the NWSs and those States with item-specific safeguards agreements[4]) could (1) enhance the effectiveness of safeguards implementation in States with a comprehensive safeguards agreement; and also (2) improve the effectiveness and efficiency of the safeguards implementation in NWSs and in "INFCIRC/66" States themselves. This is why the Foreword to that document requests the Director General to negotiate Additional Protocols with other States that are prepared to accept measures provided for in the Model document so as to contribute to the safeguards effectiveness and efficiency aims of the Protocol.

53. Each of the NWSs indicated, during the 15 May 1997 special meeting of the Board of Governors, which of the measures in the model text it was prepared to accept. The Board, and the open-ended Committee of the Board that negotiated the Model document, expressed their expectation that adoption of the Additional Protocol in States with comprehensive safeguards agreements (the Additional Protocol in its entirety) and in States having non-comprehensive safeguards agreements (selected measures) would maintain "a certain degree of parallelism". Additional Protocols with four of the NWSs Parties to the Treaty[5] and with one "INFCIRC/66-State"[6] have been signed.

D. Nuclear Fissile Material transferred from Military Use to Peaceful Nuclear Activities

54. The 1995 "Principles and Objectives", inter alia, called for nuclear fissile material transferred from military use to peaceful nuclear activities to be placed under IAEA safeguards as soon as practicable in the framework of the Voluntary Offer safeguards agreements in place in the NWSs. Following the decision of the United States of America, first promulgated in September 1993, to submit nuclear material deemed not to be needed for military programmes to Agency safeguards, the Agency was requested to begin verification of 10 tonnes of stored highly enriched uranium at one facility in the USA. The amount of material placed under safeguards has now increased and includes plutonium at two additional storage facilities. In addition, the Agency has started the verification of the down-blending of some 50 tonnes of excess highly enriched uranium in the USA.

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[4] Safeguards agreements concluded on the basis of Agency document INFCIRC/66 Rev. 2 with States which have not undertaken any comprehensive non-proliferation commitments. Such agreements specify the specific material/items to be safeguarded.

[5] China, France, United States of America, United Kingdom. An Additional Protocol with the Russian Federation is expected to be submitted to the Board of Governors shortly.

[6] Cuba

55. In September 1996, the United States of America and the Russian Federation launched a joint initiative concerning Agency verification of weapon-origin fissile material in the USA and the Russian Federation. A new verification system was considered to be necessary to ensure that fissile material submitted for verification is irrevocably removed from nuclear weapons programmes, and to take account of special characteristics of material submitted. Over the past three and half years, the three Parties have been addressing the various technical, legal and financial issues involved. Work is continuing on the preparation of a model verification agreement and on verification arrangements. These arrangements must enable the Agency to verify nuclear material while not disclosing any information that would be in violation of the relevant States' obligations under Article I of the NPT.

56. Over and above these developments, the United Kingdom has unilaterally reduced its nuclear forces and has released significant fissile material inventories from military use. These fissile materials are now subject to EURATOM safeguards, and are also eligible for submission to IAEA safeguards under the United Kingdom's Voluntary Offer Safeguards Agreement.

F. IAEA Resources to Meet its Safeguards Responsibilities

57. Past NPT Conferences, including the 1995 Conference, have recognized the need for the IAEA to be provided with the necessary financial and human resources "to ensure that the Agency is able to meet effectively its responsibilities". Notwithstanding, despite the increase in the amount of nuclear material placed under IAEA safeguards, and in the number and complexity of facilities to be safeguarded, IAEA Member States have applied a policy of zero real growth to the IAEA's budget, which has shown only minuscule increases in limited areas since 1985. Insofar as safeguards are concerned, Member States have supplemented these resources with voluntary contributions in the form of expertise, equipment and analytical services. In the projected budget for 2001, over 20% of the full cost of the safeguards programme lies outside of the regular budget. The Agency's reliance on extrabudgetary funds makes planning increasingly difficult and limits the ability to prioritize work in an efficient and effective manner. Further details on workload and resources are presented in Section VI below.

IV. OTHER ASPECTS OF IAEA SAFEGUARDS SINCE 1995

A. Iraq

58. In 1991, following the discovery of Iraq's clandestine enrichment and nuclear weapons programmes, the United Nations Security Council adopted Resolutions 687, 707 and 715. Collectively, these resolutions call, inter alia, for Iraq unconditionally to agree not to acquire or develop nuclear weapons or nuclear-weapons-usable material or any subsystems or components or any research, development, support or manufacturing facilities related to the above; to submit to the Secretary-General of the United Nations and to the Director General of the IAEA a declaration of the locations, amounts, and types of all of the items specified; to halt all nuclear activities of any kind, except for use of isotopes for medical, agricultural or industrial purposes; to place all of its nuclear-weapons-usable material under the exclusive control of the IAEA, for custody and removal; and to accept

on-site inspection and the destruction, removal or rendering harmless, as appropriate, of all specified items and materials.

59. The Security Council approved the plans, developed by the Director General, to carry out these steps, including the plan for the Ongoing Monitoring and Verification of Iraq's compliance with the above.

60. Details about Agency activities in Iraq up to the time of the 1995 NPT Review and Extension Conference were given in the Background Paper in NPT/CONF.1995/7. By September 1994, major elements of the IAEA's Ongoing Monitoring and Verification plan had been set in place, including continuous Agency presence in Iraq. Monitoring activities included short notice inspections, environmental sampling, remote surveillance, as well as the constant follow-up on the clarification of remaining questions and concerns. An export-import monitoring system was also approved by the Security Council in Resolution 1051.

61. As a result of the IAEA inspection activities, a technically coherent picture of Iraq's clandestine nuclear programme has evolved - a programme aimed at the production of an arsenal of nuclear weapons, based on implosion technology. A detailed description of the Agency's achievements and Iraq's past programme is provided in the report of the Director General of the IAEA to the Security Council in October 1997 (S/1997/77).

62. The Agency activities relevant to the UN Security Council resolutions in Iraq have been suspended since the withdrawal of Agency personnel from Iraq on 16 December 1998. Some restrictions of rights imposed by Iraq to the Agency teams in 1998, like the denial of access to any sites other than those for which Iraq routinely provides declarations implied a significant decrease of the level of assurance that the Agency could provide to the international community. Since 16 December 1998, the Agency has not been able to implement its mandate in Iraq and, as a consequence, to provide any assurance that Iraq is in compliance with its obligations under the relevant resolutions.

63. UN Security Council Resolution 1284, adopted in December 1999, confirms the mandate of the Agency as defined by the previous resolutions. However, as of February 2000, the Agency has not yet been able to resume its related activities in Iraq.

64. During the time the IAEA was able to perform its mandate in Iraq pursuant to the above Security Council resolutions, the activities to be carried out by it in Iraq under the NPT safeguards agreements were subsumed under the more comprehensive and intrusive activities pursuant to the Security Council resolutions. In view of its inability to carry out Security Council-related activities since December 1998 and given its dual legal obligations pursuant to the NPT safeguards agreement, the Agency carried out an inspection in Iraq, in accordance with the NPT safeguards agreement, in January 2000 on the inventory of nuclear material remaining in the country.

B. Democratic People's Republic of Korea (DPRK)

65. The Agency remains unable to verify the correctness and completeness of the initial declaration of the DPRK of its nuclear material subject to safeguards and accordingly cannot provide any assurance about non-diversion. The DPRK remains in non-compliance with its safeguards agreement, and accepts the Agency activities solely within the context

of the Agreed Framework concluded between the United States of America and the DPRK in October 1994.

66. The Background Paper NPT/CONF.1995/7 described the Agency's activities in the DPRK up to January 1995. Since that time, the Agency has continued monitoring of the freeze and is maintaining a continuous inspector presence in the Nyongbyong area.

67. During 1996 the canning of the spent fuel rods which had been discharged from the DPRK's 5 MW(e) Experimental Nuclear Power Reactor in May 1994 was begun, without the safeguards measures requested by the IAEA in accordance with the DPRK's Safeguards Agreement. The Agency has not been allowed by the DPRK to make the required measurements of these rods. After some delays, the canning operations are nearing completion.

68. From 1995 to 1999, progress was made with regard to some safeguards measures required by the Agency but not others. For example, the DPRK agreed to more inspector designations, to arrangements for improved communication between Agency headquarters and inspectors, to the replacement of surveillance systems with digital surveillance, and to the installation of a monitoring system at one part of the DPRK's Radiochemical Laboratory (Reprocessing Plant). However, despite thirteen rounds of technical consultations between the Agency and the DPRK since 1994, no progress has been made on certain key issues, in particular the preservation of the information needed to enable the Agency to verify the DPRK's initial declaration of its nuclear material and facilities subject to safeguards. Other issues have also remained unresolved. For example, the DPRK has refused to allow the Agency to install equipment to monitor liquid nuclear wastes at the reprocessing plant to ensure that there is no movement or processing of such wastes. The DPRK has also declined to let the Agency conduct environmental sampling at any sites, including those facilities at which routine inspections are taking place. The DPRK continues to link the extent of its co-operation with the Agency to progress in the implementation of the Agreed Framework between the DPRK and the United States of America.

C. Nuclear-Weapon-Free Zones

69. Article VII of the NPT provides that, "Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories." Regional arrangements are a means through which confidence in and between the States of a specific region can be established and nurtured.

70. The 1995 Conference reaffirmed the conclusion that the establishment of internationally recognized nuclear-weapon-free zones (NWFZs), on the basis of arrangements freely arrived at among States of the region concerned, enhances global and regional peace and security. It encouraged, as a matter of priority, the development of further NWFZs by the year 2000, taking into account the characteristics of each region, and made clear that the co-operation of all the nuclear-weapon States and their support for the relevant protocols were necessary for the maximum effectiveness of NWFZs.

71. Document NPT/CONF.1995/7 noted that the treaty-based NWFZs then established or currently under negotiation provide for verification arrangements closely linked with safeguards implementation pursuant to the NPT. That situation continues to pertain.

72. Developments since the 1995 NPT Review and Extension Conference have resulted in the following situation with regard to States Party to regional nuclear-weapon-free zone agreements. Comprehensive safeguards agreements are in force with 31 of the 32 contracting States Party to the *Treaty for the Prohibition of Nuclear Weapons in Latin America* (the "Treaty of Tlatelolco"). All 11 States which are contracting Parties to the *South Pacific Nuclear Free Zone Treaty* (the "Treaty of Rarotonga") have met its requirement to bring into force comprehensive safeguards agreements which are pursuant to the NPT or equivalent in scope and effect. The *Treaty on the Southeast Asia Nuclear-Weapon-Free Zone* (the "Treaty of Bangkok") entered into force on 27 March 1997. Eight of the 10 contracting States Party to the Treaty of Bangkok have brought into force comprehensive safeguards agreements pursuant to the requirements of the treaty. The *African Nuclear-Weapons Free-Zone Treaty* (the "Pelindaba Treaty"), which was opened for signature on 11 April 1996 but has not yet entered in force, also requires States Party to bring into force comprehensive safeguards agreements. Six of the 8 States that have ratified the Pelindaba Treaty have comprehensive safeguards agreements in force. Negotiations among 5 States of the Central Asian region on a *Central Asian Nuclear-Weapon-Free Zone Treaty* began in 1997.

D. The Middle East

73. The 1995 NPT Conference, inter alia, adopted resolution NPT/CONF.1995/32/RES/1 which, inter alia:

> "Notes with concern the continued existence in the Middle East of unsafeguarded nuclear facilities, and reaffirms in this connection the recommendation contained in paragraph VI/3 of the report of Main Committee III urging those non-Parties to the Treaty which operate unsafeguarded nuclear facilities to accept full scope International Atomic Energy Agency safeguards" and
>
> "Calls upon all States in the Middle East to take practical steps in appropriate forums aimed at making progress towards, inter alia, the establishment of an effectively verifiable Middle East zone free of weapons of mass destruction, nuclear, chemical and biological, and their delivery systems, and to refrain from taking any measures that preclude the achievement of this objective."

74. Every year since the 1995 Conference, the IAEA General Conference has, in its turn, affirmed the need for all States in the Middle East to accept the application of full-scope safeguards to all their nuclear facilities[7] and called upon all Parties directly concerned to consider seriously taking the practical and appropriate steps required to establish a mutually

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[7] At present, with the exception of Israel, all States of the region have accepted comprehensive safeguards by virtue of being Party to the NPT. Some of these States, however, have not yet concluded the required safeguards agreement. Israel has accepted only an item-specific ("INFCIRC/66") safeguards agreement on one nuclear facility.

and effectively verifiable NWFZ in the region of the Middle East. In the latter connection, and in response to a request of the 1997 General Conference, the Agency held a third workshop on safeguards, verification technologies and other related experience in May 1998, with the aim of helping further to clarify, especially for States of the Middle East region, the choices, options and verification modalities which could feature in an eventual Middle East NWFZ agreement.

75. Since that time, the Director General of the Agency has continued his consultations with the countries in the Middle East, as requested by successive IAEA General Conferences, regarding general and specific aspects of the application of comprehensive safeguards to all nuclear facilities in the Middle East and to the preparation of model agreements relating to the verification of compliance with a future Middle East NWFZ Treaty. In this regard, in May 1999, the Director General wrote to the Foreign Ministers of States of the Middle East region seeking their views, in particular, on practical steps to foster a climate of confidence which could lead to the application of safeguards on all nuclear facilities in the region. He also sought their views on the geographical limitations of a future Middle East NWFZ and on the commitments which different groups of States might undertake within such a zone.

E. Nuclear Material Security

1. Illicit Trafficking in Nuclear Material

76. As stated in document NPT/CONF.1995/7, cases of illicit trafficking in nuclear materials have alarmed the international community for a number of years and are of particular concern to the Agency where the nuclear material involved is of safeguards relevance. States' concerns about the trafficking problem led to the adoption of a resolution, at the IAEA General Conference in September 1994, which called upon Member States "to take all necessary measures to prevent illicit trafficking in nuclear material" and invited the Director General "to intensify the IAEA's activities through which the Agency is currently supporting Member States in this area" and to prepare proposals for additional activities.

77. In March 1995, the Board approved proposals by the Director General for a programme to assist States in their efforts to prevent, detect and respond to illicit trafficking in nuclear materials and other radioactive sources. Building on earlier work within the Agency, the programme included the development of a reliable database of information on incidents of illicit trafficking, to help assist States combat trafficking and in order better to inform the public. The Agency's database became fully functional in 1997. In 1998, the Illicit Trafficking Database Programme was reviewed, improvements made and parameters were agreed for maintaining the confidentiality of the information reported.

78. As of 1 January 2000, 67 States were participating in the database programme. The database contains information on illicit trafficking incidents in chronological order, including, inter alia, measurement results and law enforcement actions. Periodically the Agency distributes summary reports to participating States. To date, the database contains details of some 369 trafficking incidents, 284 of which have been confirmed by States. Most of the incidents reported have involved low enriched, natural or depleted uranium and radioactive sources but some cases have involved limited quantities of highly enriched uranium or plutonium. Nuclear material recovered in trafficking is placed under Agency

safeguards. The continued reporting of trafficking bears witness to the fact that there continue to be deficiencies in the control of nuclear and other radioactive materials.

2. Physical Protection

79. At the 1995 NPT Conference, States Parties to the Treaty noted the paramount importance of effective physical protection of nuclear material and of observing guidelines and standards in this area.

80. In 1998, the IAEA Secretariat and 35 Member States completed a review of the recommendations for the physical protection of nuclear material elaborated under IAEA auspices[8]. These recommendations are widely accepted as the international standards for physical protection. The review resulted in strengthened recommendations for the protection of nuclear material in transport, use and storage and for the protection of nuclear facilities against the threat of sabotage. The Agency is carrying out a programme to help States implement these recommendations. It includes staff training in implementing nuclear material control and physical protection and providing technological support for the upgrading of physical protection in several States.

81. Since 1995, the Secretariat has been organizing, upon request, International Physical Protection Advisory Service (IPPAS) missions to review States' physical protection systems, assess whether they meet international standards, and make suggestions for improvement where necessary. These missions have provided a mechanism through which the Agency can convey information about needs of assistance to States willing to provide it. To date, IPPAS missions have been dispatched to 8 States.

82. In 1997 the Agency convened a Conference on the Physical Protection of Nuclear Material: Experience in Regulation, Implementation and Operation. Key points arising in the presentations and discussions included: (a) the continuing need to review and upgrade elements of physical protection systems, particularly the security of old facilities; (b) the desirability of using, where practical, the advanced technologies becoming available; and (c) the need to continue bilateral and multilateral exchanges of experience and information.

83. There are now 64 Parties to the Convention on the Physical Protection of Nuclear Material, 10 States having become Parties thereto since the 1995 Conference. In November 1999, as requested by some States Party to the Convention, the Director General convened an informal, open-ended expert meeting to discuss whether there is a need to revise the Convention. The meeting decided that a more detailed examination of a number of issues (e.g. nature, scale and implications for physical protection, of illicit trafficking) was needed prior to any conclusions being drawn about the need to revise the Convention. The expert meeting is to complete its deliberations, and report thereon to the Director General by mid-2001.

F. The Proliferation Potential of Neptunium and Americium

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[8] The Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Rev.4.)

84. As a result of the increased awareness of the proliferation potential of neptunium (Np) and americium (Am), and emerging projects in peaceful nuclear programmes which could result in an increase in the available quantities of separated Np and Am, the Director General submitted a document on the issue to the Board of Governors in November 1998. Article II of the NPT proscribes the use by NNWSs Party to the Treaty of any material to manufacture a nuclear weapon or other nuclear explosive device. Thus, the fact that Np, and with considerably greater difficulty, Am, if available in sufficient quantities in separated form, could be used to manufacture nuclear explosive devices, is relevant in the context of Article II and III of the Treaty, notwithstanding that neither Np nor Am are currently defined as "source or special fissionable material" in terms of Article XX of the Agency's Statute.

85. The Board considered the item at length at its meetings in December 1998, and March and June and finally September 1999. The options for action put forward by the Secretariat, comprised (1) amending Article XX of the IAEA Statute to include Np and Am in the definitions of "source or special fissionable material"; (2) implementing, with the voluntary co-operation of States, measures to monitor stocks of separated Np and Am and to institute certain technical measures known as "flow sheet verification" at relevant facilities with a view to be able to draw conclusions as to whether Np or Am were being separated; or (3) taking no action at this time. The Board concluded that designating Np and and/or Am as "nuclear material" would be premature, given the small amounts currently known to be available in separated form, and that doing nothing could undermine credibility of the safeguards system.

86. In September 1999 the Board decided to authorize the implementation of the second option for the monitoring of Np. By the end of 1999 the Agency had initiated an exchange of letters with relevant States to put the receipt of information about Np and the application of monitoring measures on an established footing. With regard to Am the Board concluded that at present there is practically no proliferation risk, but asked the Director General to report relevant developments as to the availability of the material and programmes in States which may lead to acquisition of such material.

V. REVIEW, RESPONSIVENESS AND ASSESSMENT

A. Safeguards Effectiveness

87. Previous NPT Conferences, including the 1995 Conference, have stressed the importance of strengthening the effectiveness of safeguards. Effectiveness in respect of declared nuclear material is represented, inter alia, by the extent to which inspection goals are attained as reported each year in the Agency's Safeguards Implementation Report (SIR). The Agency's Safeguards Criteria comprise an extensive set of inspection activities which, if performed successfully, can detect diversion should it occur. In instances of non-attainment of inspection goals, all relevant factors are carefully assessed as part of the process of drawing the overall annual safeguards conclusion.

88. As reported in document NPT/CONF.1995/7, since the first SIR was produced in 1977, inspection goal attainment for nuclear facilities has increased significantly compared

with the 17% in 1977. Between 1995 and 1998, there has been a further improvement in the goal attainment for nuclear facilities from 73% to 82%.

89. In keeping with the findings of previous NPT Conferences, the Agency continues to give priority to implementing safeguards on "unirradiated direct use" nuclear material, i.e. plutonium and highly enriched uranium from which nuclear weapons could readily be made. By 1998, the attainment of the quantity component of the inspection goal for such material had increased from 79 % in 1995 to 86 % of the facilities with such materials. This also reflects, inter alia, the considerable amount of work that the IAEA has undertaken to ensure the continuing effectiveness of safeguards at reprocessing facilities and at facilities for the storage and use of separated plutonium.

90. In the SIR for 1998, the Agency for the first time reported the limited results of Additional Protocol implementation. In time and with further experience in such implementation, conclusions reflected in the SIR will also address undeclared nuclear material and nuclear activities in the State as a whole, in addition to the non-diversion of nuclear material.

B. Safeguards Efficiency

91. Efficiency is a measure of how well resources (staff, equipment, money) are used to fulfil the Agency's obligations in the implementation of safeguards, and is a matter of prime importance to States and to the Agency. Efficiency involves a variety of factors, some of which are beyond the Agency's control. Ongoing efforts with regard to integration of safeguards (see paragraphs 128-132) aim at a more effective system within available resources - thereby also a more efficient system.

92. One parameter that can be used to assess efficiency is the monetary cost of safeguards per significant quantity (SQ) of nuclear material. The Background Paper for the 1995 Conference made clear that this has fallen dramatically since 1981 when the cost to verify one SQ was US $2,200 In 1995 the cost was US $460 and in 1998 it was US $400. The reduction is due, in large part, to economies of scale.

C. Responsiveness of Safeguards

93. NPT safeguards agreements impose a number of obligations on the IAEA which oblige it to respect the interests of the State. The final documents of NPT Review Conferences have reflected the importance that States attach to these requirements. In implementing safeguards the IAEA endeavours to satisfy the requirements and to adjust to new and changing circumstances. The following paragraphs summarize the responsiveness to key requirements.

1. Avoiding Undue Interference in States' Peaceful Nuclear Activities

94. IAEA safeguards procedures and practices allow a flexible implementation by adapting the specifics of safeguards activities to the particular circumstances of individual nuclear facilities, thereby meeting the requirements of comprehensive safeguards agreements to avoid hampering the economic and technological development of, and undue

interference in, the States' peaceful nuclear activities. This is also emphasized in the preamble to the Model Additional Protocol.

2. Protecting Commercial and Industrial Secrets and Other Confidential Information

95. NPT safeguards agreements require the IAEA to take every precaution to protect commercial and industrial secrets and other confidential information coming to its knowledge in the implementation of safeguards agreements. The IAEA Statute obliges all staff to refrain from disclosing information coming to their knowledge through their official duties. The IAEA employment contract obliges Agency staff not to disclose such information, an obligation that does not lapse upon termination of employment.

96. Maintaining the confidentiality of information was a matter of great importance to the open-ended Committee of the Board of Governors which negotiated the Model Additional Protocol. Indeed, the document incorporates a specific requirement upon the Agency to maintain a stringent regime to ensure effective protection against disclosure of commercial, technological and industrial secrets and other confidential information coming to its knowledge. A regime for handling and maintaining confidential information was approved by the Board in December 1997.

3. Principles for Recruitment of Staff

97. The IAEA continues to recruit and train its staff in accordance with the precepts of Article VII.D of its Statute which stipulate that the paramount consideration in the recruitment and employment of staff is to "secure employees of the highest standards of efficiency, technical competence and integrity". The importance attached to this has been emphasized in final documents of NPT Conferences.

98. The Statute also pays due regard, subject to the above consideration, to "the importance of recruiting the staff on as wide a geographical basis as possible". The Agency's Safeguards Traineeship Programme contributes towards broadening the geographical base for the recruitment of staff. Each course is an intensive training programme designed to increase the number of qualified candidates from developing countries for Professional safeguards posts. From courses held in 1996 and in 1999, seven trainees (out of twelve) are currently employed as IAEA safeguards inspectors. Other trainees have joined their home countries' SSACs, thereby also contributing to the effectiveness of the safeguards.

99. As of the end of 1999, 286 staff members had been approved by the Board of Governors as safeguards inspectors and inspection assistants. 41% of them were from developing countries. These inspectors and inspection assistants have been recruited from 70 countries, 46 of which are developing countries.

100. In order to maintain the highest professional standards of the safeguards staff, the IAEA carries out extensive inspector training. All inspectors are required to attend an Introductory Course on Agency Safeguards (ICAS). Further training courses include topical training, facility-related training and refresher training. Since 1995, specific training helps

to prepare inspectors for implementing safeguards strengthening measures such as environmental sampling and broad-based information analysis.

101. The IAEA also offers extensive training for Member State personnel in the areas of nuclear material control, accountancy and physical protection. During 1998 for example, such training involved 275 State personnel and a total of 1554 person-days of instruction.

4. Co-operation with State Systems of Accounting and Control (SSAC)

102. Comprehensive safeguards agreements call for co-operation between the IAEA and the States through their SSACs to facilitate the implementation of safeguards. Past NPT Conferences have recognized the importance of State and regional accounting and control systems to effective and efficient safeguards. Keenly aware of the value technically qualified SSACs, the Agency has, for many years, carried out programmes to assist States in the development and implementation of their SSACs, including through the provision of SSAC guidelines and of training courses for SSACs staff.

103. In 1992, a major initiative was taken to improve the efficiency and effectiveness of safeguards implementation in the European Union through new arrangements referred to as the New Partnership Approach (NPA). This was prompted, inter alia, by the desire of both the IAEA and of EURATOM to conserve resources and avoid unnecessary duplication of effort. As stated in the Background Paper for the 1995 NPT Conference, the procedures take into account the requirement of the IAEA to draw independent conclusions.

104. Significant reductions in the Agency's inspection effort have been obtained in the States of the European Union as a result of the NPA and from the shutdown of certain major facilities. Inspection procedures have been revised to avoid duplication, whilst concurrently maintaining IAEA independence. The NPA arrangements include joint use and development of equipment, training, the sharing of on-site analytical capabilities and co-operation during inspections.

105. Co-operation has also increased with the Brazilian-Argentine Agency for Accounting and Control of Nuclear Material (ABACC), resulting in improved efficiency of safeguards implementation. Further, enhanced co-operation is foreseen in a co-operation agreement concluded by the two organizations in 1998, joint procurement and use certain safeguards equipment, shared training and co-ordination of inspection work.

106. An important area of Agency co-operation with State and regional systems, and with facility operators, is the development, testing and implementation of new safeguards approaches and techniques. In recent years co-operation has focused on such issues as environmental sampling, remote monitoring, random inspections, new surveillance equipment and advanced Non Destructive Assay (NDA) equipment.

5. More Cost-effective Inspection Procedures

107. Comprehensive safeguards agreements call for the IAEA to take full account of technical developments in safeguards. The IAEA maintains an active programme, largely in co-operation with Member State Support Programmes, to develop new techniques and improved procedures. New procedures for short notice random inspection and the use of

advanced technology for safeguards equipment are examples of development efforts which are in response to the relevant provisions in safeguards agreements.

6. Concentration of Verification on Weapons-Usable-Nuclear Material

108. As stated before, inspection effort under comprehensive safeguards agreements concentrate on unirradiated plutonium and highly enriched uranium nuclear materials from which nuclear weapons could readily be made. The annual effort to verify one significant quantity (SQ) of unirradiated plutonium or HEU averaged 0.35 person-days of inspection (PDI), while verifying 1 SQ of irradiated nuclear material averaged 0.06 PDI (1998 figures). This much lower value for inspection effort devoted to irradiated nuclear material results from the fact that safeguards on such material can be based on item accountancy safeguards and on extensive use of containment and surveillance.

7. Increased Transparency of IAEA Safeguards

109. The Agency has responded to the calls during the 1995 NPT Conference to improve the transparency of the presentation of the results of IAEA safeguards activities so that information about the results can be made public while concurrently maintaining confidentiality. The Safeguards Implementation Report (SIR) remains the main vehicle through which safeguards results are presented to the IAEA Board of Governors and to Agency Member States. Since 1995, the information content of the SIR has been expanded considerably, and improvements made to make the information more readily comprehensible. An Executive Summary of the SIR, introduced in 1994, is now a regular feature and provides the public at large with more information about IAEA safeguards implementation. Additionally, starting in 1996, the IAEA introduced an Annex to the SIR which gives a summarized description of the main elements of IAEA safeguards. It is updated yearly, and has been developed specifically with a view to readers who might not be familiar with the precepts and procedures of safeguards implementation.

110. Information about the results of safeguards continues to be reflected in the annual safeguards statement. This is made available publicly through the IAEA Annual Report. The Agency continues to give priority to providing more comprehensive information to the general public and has identified a number of relevant areas with this in mind.

8. New and Complex Nuclear Facilities

111. A continuing challenge for the IAEA and Member States has been to prepare for and implement safeguards at new and increasingly complex nuclear facilities. Large commercial enrichment plants employing several different enrichment technologies, large-scale automated reprocessing plants and MOX fuel fabrication plants involving remote handling are examples of nuclear facilities that require extensive safeguards arrangements and where planning such arrangements at an early stage facilitates the subsequent implementation of safeguards.

112. A particular challenge in the next years is preparation for and the implementation of effective safeguards at - one or possibly two - large commercial reprocessing facilities. In this context, in 1997, the Agency established a project to plan, co-ordinate and integrate all the activities necessary to design and implement effective and efficient safeguards,

including the development of the safeguards approach for one reprocessing plant and for the planned, on-site analytical laboratory. The plan stipulates that extensive design information verification is carried out during the construction and commissioning phase and that infrastructure for the implementation of safeguards is established before operations commence. The implementation of safeguards at this complex type of facility will require substantial investment of staff and money. Significant support will be required from Member States.

9. Voluntary Offer Agreements (VOAs) with Nuclear-Weapon States

113. As stated in document NPT/CONF.1995/7 and in paragraph 18 above, NWSs Party to the NPT are not committed by Article III to conclude safeguards agreements with the IAEA. These States have, however, voluntarily offered parts or all or their civilian nuclear fuel cycles for safeguards by the Agency. VOAs have been concluded with each of the five NWSs[9].

114. Universality with regard to the implementation of Agency safeguards in States has been a focus of past NPT Review Conferences. As noted in paragraph 53 above, China, France, the United Kingdom and the United States of America have negotiated and signed Additional Protocols to their respective VOAs.[10]

VI. SAFEGUARDS WORKLOAD AND RESOURCES

A. Workload

115. Since 1995, the number of nuclear facilities and locations outside facilities under safeguards has increased from 885 to 897. They include new power reactors, and facilities for fuel fabrication, uranium enrichment and storage. The number of facilities which were inspected at least once a year increased by 6 %. This reflects the growth in the Agency's overall safeguards work load.

116. Much greater increases have occurred in the quantities of nuclear material under safeguards (Figure 1). The increase which has had the greatest impact on the safeguards work load is in separated plutonium. Since 1995, the quantities of unirradiated plutonium (outside reactor cores) and highly enriched uranium increased about 35%. Material in this "direct use" category requires the most intensive safeguards. Forecasts show no abatement in the projected increases of plutonium and highly enriched uranium quantities, which may well increase further as more reprocessing plants come on stream and, possibly, as additional nuclear material declared excess to military requirements comes under safeguards.

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[9] Between the IAEA and the United Kingdom (1978), the United States (1980), France (1981), the former Soviet Union, now the Russian Federation (1985) and the People's Republic of China (1989).

[10] A draft Additional Protocol for the Russian Federation is expected to be submitted to the Board of Governors for approval shortly.

117. The quantity of irradiated direct-use nuclear material (mostly plutonium) under safeguards has increased by 17% since 1995. The safeguards effort expanded on this is relatively insensitive to increases in total quantity for as long as the material remains in reactor storage ponds. However, as quantities of spent fuel increase, increasing amounts will be transferred to dry storage to which future access will be difficult. Consequently, the Agency will have to verify fuel transfers before the fuel arrives in dry storage. This is a cost-intensive process. During 1998, about 8% of total person-days of inspection were used to verify such transfers.

118. Increases have also occurred in the quantities of indirect-use material under safeguards, including low enriched uranium and source material, although to a lesser extent (2.4%). Increases in these materials do not impose any significant new verification burden.

B. Resources

119. Past NPT Conferences have, inter alia, recognized the need for the IAEA to be provided with the necessary financial and human resources to ensure that the Agency is able to continue to meet its safeguards responsibilities effectively. Specifically, the 1995 Conference made clear that "Every effort should be made to ensure that the IAEA has the financial and human resources necessary in order to meet effectively its responsibilities". Notwithstanding this, and despite increases in the overall amount of nuclear material under safeguards and in the number and the complexity of facilities to be safeguarded, paragraph 57 makes clear that IAEA Member States have continued to apply a policy of "zero real growth" to the IAEA's budget. A few times since 1985 the budget has increased minimally, but such limited resource adjustments cannot keep pace with the increasing work load.

120. Against this background, the Agency has become increasingly dependent on voluntary, extrabudgetary contributions from some of its Member States. Such contributions represented 17% of the total safeguards programme costs for 1998 and is projected to reach 20% in 2001. The Agency Secretariat has made clear to Member States that such heavy reliance on extrabudgetary funds is unsound.

121. Since extrabudgetary funding has been made available for, inter alia, the purchase of equipment, the Agency has been able to use a larger proportion of the regular budget to increase its staff (safeguards inspectors and other Professionals) to keep pace with the increasing workload. However, more than half of this increase was in temporary contracts.

122. The Agency has already made arrangements to carry out Voluntary Offer verification activities, funded by extrabudgetary resources, of nuclear material from the nuclear weapon programme in the United States of America. This was discussed in paragraph 54 above. Paragraph 55 describes the initiative that the USA and the Russian Federation launched in 1996 with the Agency, that would lead to a new verification approach for weapon-origin fissile material enabling the Agency to draw independent and credible conclusions, while ensuring that no classified information could be acquired by the inspectors. In the light of the budgetary situation described above, it is clear that new Agency activities in the area of weapon-origin fissile material will pose a challenge for the Agency, not only in technical terms, but also in terms of resource requirements. For that reason, the Director General presented a paper to the Board in June 1999, with options for financing Agency verification of activities that are related to nuclear arms control and reduction measures including the

option of a separate "Nuclear Arms Control and Reduction Verification Fund". One of the key considerations in the paper was that the funding mechanism needs to be predictable and reliable. The Board had an initial discussion on the subject and interesting proposals were put forward. The discussion is expected to continue when the verification tasks envisaged become more concrete.

C. Workload and Resource Projections in the Near Term

123. The increase in the safeguards workload will continue during the next several years as new facilities come into operation and as States' Additional Protocols come into force. In the latter context, the evaluation of the initial declarations received from States under the Additional Protocol, and of other information available on their nuclear activities, will impose a significant burden but, at this particular juncture, it is impossible to quantify it precisely. In the long run, the Agency is committed to a programme of integrated safeguards, and to maintaining cost-neutrality. However, cost-analysis of new approaches to safeguards show that available resources will be insufficient for the increased workload in the short to medium term.

124. A conservative estimate indicates a need to increase IAEA resources under the regular budget, to ensure reliable funding for the new tasks, and decrease its dependency on extrabudgetary funding. In a few years time, it should be possible to take stock again. Later on, the picture with regard to some of the scenarios described above in this section, should also be clearer, as should be the impact upon resources of Additional Protocols, the integration of safeguards (see paragraphs 128-132), and other changes to the safeguards system.

VII. SAFEGUARDS IN THE FUTURE

125. Previous NPT conferences have expressed or reaffirmed the conviction that IAEA safeguards play a key role in preventing nuclear proliferation. Through providing assurance that States are complying with their safeguards undertakings and by assisting States in demonstrating that compliance, safeguards promote further confidence among States and, as a fundamental element of the NPT, help to strengthen the collective security of the States Party to the Treaty. Parties have commended the IAEA on its implementation of safeguards pursuant to the NPT and urged the Agency to take full advantage of its rights.

126. NPT Conferences have also welcomed the significant contributions made by States Party to the Treaty in facilitating the application of IAEA safeguards and in supporting efforts to enhance the effectiveness and efficiency of safeguards. In this context, the conferences have recognized the critical importance of States continuing their political, technical and financial support for the safeguards system, including playing their full part in helping the IAEA to facilitate the most effective use of its verification resources.

127. The Agency must assume that all of the above considerations continue to apply. Such considerations include support for strengthened safeguards which represent maximum technical effectiveness and cost efficiency.

A. The Integration of Safeguards

128. In the above context, the most important area of current and future work is that on integrating the traditional nuclear material verification activities with new strengthening measures. This is being given the highest priority. The aim is to optimize the combination of all the safeguards measures available to the Agency in order to meet the Agency's safeguards objectives with maximum effectiveness and efficiency on the basis of cost-neutrality. For example in States with a comprehensive safeguards agreement and an Additional Protocol in force, new measures aimed at improving the Agency's ability to provide assurance of the absence of undeclared nuclear material and activities in a State as a whole, in particular those contained in the Model Additional Protocol, may lead to the relaxation of certain traditional measures on less sensitive nuclear material. This may also lead to a reduction in the costs associated with such activities.

129. The Secretariat has elaborated plans and concepts for the development of integrated safeguards that, inter alia, reflect advice provided by the Director General's Standing Advisory Group on Safeguards Implementation (SAGSI) and also takes into account the results of consultants' and experts' meetings and Working Groups. The concept is based on achieving a comprehensive understanding of nuclear activities in States, with the goal of being able to draw safeguards conclusions about the completeness and correctness of States' declarations on nuclear materials and activities. The plan includes the development and evaluation of a generic State-level safeguards approach and its application to specific fuel cycles; a re-examination of some of the basic safeguards implementation parameters (such as timeliness and detection probabilities); an examination of the relative importance of various diversion scenarios; possibilities for further co-operation with State or regional systems of accounting and control of nuclear material; and the drawing, formulation, maintaining and reporting of safeguards conclusions for a State as a whole. The development programme, co-ordinated by the Department of Safeguards, is being undertaken within the Secretariat together with the assistance of a group of experts, with advice from SAGSI and with the help of a number of Member State Support Programmes.

130. The basic principles which govern consideration of the development of integrated safeguards are that:

(a) integrated safeguards must be non-discriminatory, i.e. although the measures used may be different, the same technical objective must be pursued in all States with the same safeguards obligations; and

(b) integrated safeguards should be based on State-wide considerations.

131. The commitment to cost neutrality remains a boundary condition in the development of integrated safeguards.

132. Full implementation of the measures contained in the Additional Protocol will provide the Agency with confidence about the absence of undeclared nuclear material and activities (both at declared locations and elsewhere in a State). Such confidence, reflected in its conclusions, is necessary to start the integration process with possible reduction in inspection effort. Such integration will take into account the synergy between the measures that can be implemented under the Additional Protocol and the traditional safeguards measures. By way of example, the diversion of declared irradiated fuel and the existence of an undeclared reprocessing plant are both part of the same potential path for the acquisition

of nuclear material. Measures to detect either activity contribute to the overall ability of detecting this particular acquisition path.

B. Additional Developmental Work

133. The IAEA does not have the financial resources to carry out its own research and development programme in safeguards; rather it defines its needs, solicits Member State assistance, mostly through formal Member State programmes in support of IAEA safeguards, and oversees progress in development work. Towards these ends, the Agency maintains a Safeguards Development and Implementation Support Programme, that identifies needs for development and safeguards implementation support. The programme is revised every two years.

134. The development programme focuses on conceptual safeguards approaches, the implementation of safeguards at facilities, the development of equipment, and of computer software and on staff training. As can be inferred from paragraphs 128-132 above, an important adjunct is the extensive development effort being put into integrating INFCIRC/153(Corr.) and INFCIRC/540(Corr.) measures into a coherent whole. Field trials, in close co-operation with Member States, are a key feature of the programme.

135. An important part of the development programme has been a cost analysis of the various elements of safeguards implementation, as an indispensable basis for taking decisions with regard to safeguards integration. Cost estimates, with technical performance information, provide a basis for (1) identifying measures which can improve either the effectiveness or efficiency of safeguards and (2) determining the optimum combination of safeguards measures to be implemented within available resources.

C. Action by the States Parties

136. Recognizing the emphasis placed by the NPT Conferences on the need for certain actions to be taken by NPT States to facilitate safeguards implementation by the IAEA, an assessment of some of these actions is presented in the following subsections:

1. The Conclusion of Safeguards Agreements and Additional Protocols

137. NNWS Parties of the NPT are obliged by Article III.4 of the Treaty to conclude a safeguards agreement with the IAEA within 18 months of becoming a Party to the Treaty. As mentioned in paragraph 32, 55 States have not yet met that obligation. The majority of them has never started that process. Even though most of the States involved, as far as it is known to the Agency, do not have nuclear material or activities, the Agency cannot fulfil its responsibilities under the Treaty adequately as long as Parties have not all concluded a safeguards agreement. It should be added that the Agency's ability to provide credible assurance not only about the non-diversion of declared nuclear material but also on the absence of undeclared nuclear material and activities rests crucially upon the conclusion of safeguards agreements, and on the conclusion of Additional Protocols with all Parties.

2. Financial and Technical Support: Member State Support Programmes for IAEA Safeguards

138. Some Member States continue to contribute substantially to the Agency's efforts through dedicated Support Programmes for Agency Safeguards, several of which were established long before the 1995 Conference. To date, 15 Member States[11] and EURATOM have established Support Programmes. In addition, a number of States contribute to safeguards through research and development agreements, contracts, test programmes and field trials.

139. Member States' support is guided by the Agency's Safeguards Development and Implementation Support Programme. Areas in which this support has, over the years, been of primary importance are the development and testing of conceptual safeguards approaches, equipment development and staff training. The financial resources expended by Member States in such activities are significant but difficult to assess. These resources include substantial, "in-kind" contributions.

3. Facilitating Safeguards Implementation

140. Over and above ensuring adequate political, technical and financial support for IAEA safeguards, there are a number of other measures which, if implemented by States, would be of considerable practical value. Some pertinent ones are set out below.

Designation of Inspectors

141. Past NPT Conferences have called upon States Parties to exercise their rights regarding IAEA inspector designation proposals in such a way as to facilitate the most effective use of safeguards manpower. Many States have co-operated in this respect but some States continue to impose restrictions by applying inspector quotas, insisting on reciprocity, being unwilling to accept inspectors of certain nationalities, and significantly delaying their response to inspector designation proposals.

142. That said, the overall situation has gradually improved. Only relatively few States now restrict the number of inspectors, and the number of States noted for long response times in responding to designation requests has been decreasing. Thus, factors such as these have affected the efficient implementation of safeguards in only a few States. It nevertheless remains that, in 1999 for example, some 25 States were taking more than one year to respond to inspector designation proposals and, in the case of seven States, responses to such proposals had been outstanding for more than three years. As of1 January 2000, simplified designation procedures had been accepted voluntarily by 27 States. This had helped to reduce the average time for States' acceptance of designations from 10 months in 1993 to 3 months at the end of 1999. The situation is expected to improve further as Additional Protocols enter into force. Additional Protocols provide for further, simplified and improved procedures for inspector designation as a matter of course.

Visas

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[11] Argentina, Australia, Belgium, Canada, Finland, France, Germany, Hungary, Indonesia, Japan, the Netherlands, Russian Federation, Sweden, the United Kingdom, the United States of America and EURATOM

143. The efficient use of human resources and inspection effort has continued to be adversely affected by restrictions placed by States on the entry of designated inspectors. In this regard, it is noteworthy that, short notice or no notice inspections, which are among the key elements of the strengthened safeguards regime, cannot be carried out when restrictive visa requirements are in place.

144. The basis on which individual States issue visas to Agency inspectors continues to vary considerably. Whereas some States are prepared to grant inspectors multiple-entry visas of limited duration, others insist on single entry visas. By the end of 1999, 27 States had agreed to provide designated inspectors with multiple-entry visas, 22 of them for a period of one year or more, and 30 States did not require inspectors to have visas. The entry into force of Additional Protocols which provide the issuance of one-year multiple entry and transit visas within one month of request will further stream line the process of issuing visas.

Quality of States' Declarations under Additional Protocols

145. The efficiency with which the Agency can discharge its obligations under Additional Protocols depends critically upon the quality of States' declarations pursuant to its Article 2 and the updates they are required to provide pursuant to its Article 3. The more accurate and comprehensive these declarations and updates, the higher the quality of the Agency's analysis, evaluation and assessment. As a result, less time will need to be spent in requesting clarifications and amplifications, on bringing questions or inconsistencies to the attention of a State, and, as a consequence, on complementary access activities. As stated, the IAEA has developed special guidelines and formats for declarations under the Additional Protocol and has also developed computer software to help in this regard, which it has made available to Member States at no cost.

CONCLUSIONS

146. IAEA safeguards concepts, objectives, approaches and implementation have evolved progressively as a result of a mix of political evolutions and technological developments. Two of the major milestones in this evolution have been the entry into force of the NPT in 1970 and the decision to develop a strengthened safeguards system as a result of the experiences in Iraq. Substantial efforts and progress towards strengthening safeguards have been made since the 1995 Review and Extension Conference. They have focused in particular on enhancing the IAEA's capability to detect the existence of any undeclared nuclear material and activities, and on improving safeguards effectiveness whilst concurrently seeking to improve cost-efficiency.

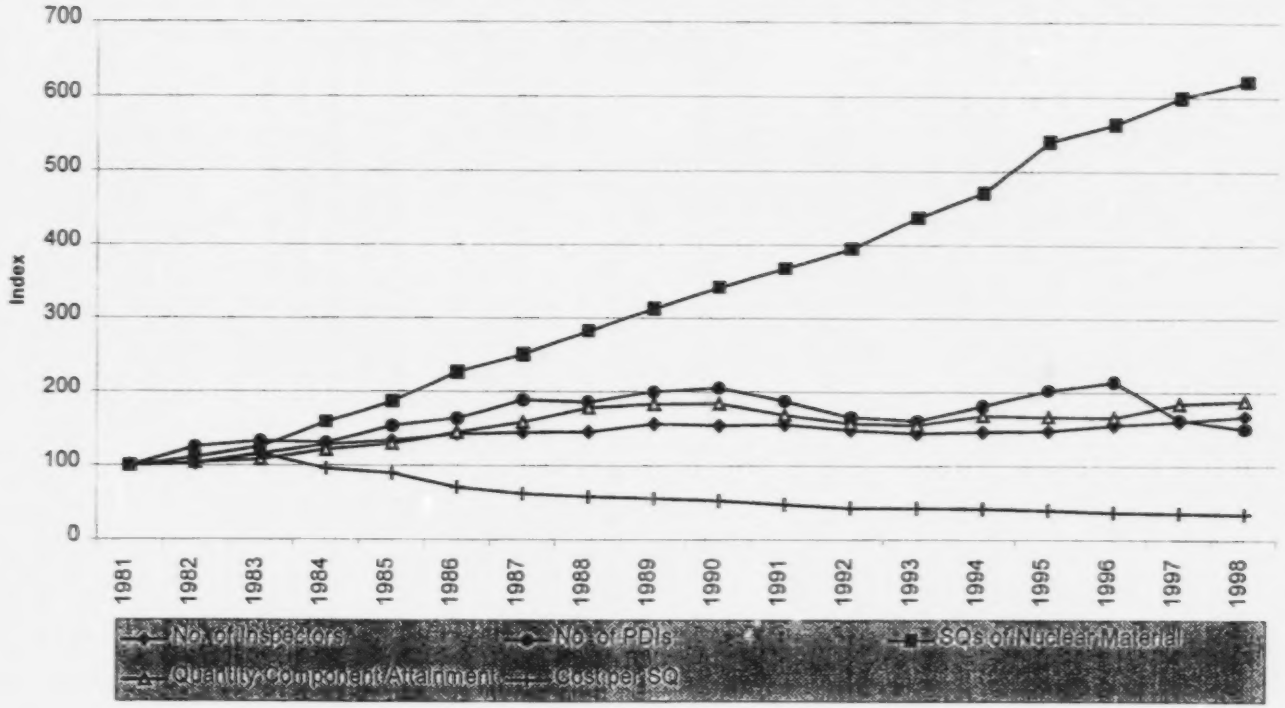
147. A high point in the evolution of strengthening safeguards was the adoption of the Model Additional Protocol by the Board of Governors in May 1997, which provides for more information about a State's nuclear material and activities and greater access to locations at which nuclear material is or could be present. The strengthening process will gain ground as more and more States bring Additional Protocols into force. Much remains to be accomplished in this regard, starting with the entry into force of all outstanding comprehensive safeguards agreements and the conclusions of Additional Protocols by all non-nuclear-weapon States Party to the NPT.

148. The ultimate success of the collective safeguards strengthening efforts will depend, above all else, on the extent to which States Party to the NPT grant the IAEA the requisite authority, co-operation and resources to verify effectively and efficiently that States Party to the NPT are honouring their non-proliferation undertakings.

ANNEXES

Figure 1

Figure 1. Agency Resources, Utilization and Results



Annex 1

"Principles and Objectives for Nuclear Non-Proliferation and Disarmament" as Relevant to IAEA Safeguards

"6. The development of nuclear-weapon-free zones, especially in regions of tension such as in the Middle East, as well as the establishment of zones free of all weapons of mass destruction should be encouraged as a matter of priority, taking into account the specific characteristics of each region. The establishment of additional nuclear-weapon-free zones by the time of the Review Conference in the year 2000 would be welcome."

"9. The IAEA is the competent authority responsible to verify and assure, in accordance with the statute of the IAEA and the Agency's safeguards system, compliance with its safeguards agreements with States Parties undertaken in fulfillment of their obligations under article III(1) of the Treaty, with a view of preventing diversion of nuclear material from peaceful uses to nuclear weapons or other nuclear explosive devices. Nothing should be done to undermine the authority of the IAEA in this regard. States Parties that have concerns regarding non-compliance with the safeguards agreements of the Treaty by the States Parties should direct such concerns, along with supporting evidence and information, to the IAEA to consider, investigate, draw conclusions and decide on necessary actions in accordance with its mandate.

10. All States Parties required by article III of the Treaty to sign and bring into force comprehensive safeguards agreements and which have not yet done so should do so without delay.

11. IAEA safeguards should be regularly assessed and evaluated. Decisions adopted by its Board of Governors aimed at further strengthening the effectiveness of IAEA safeguards should be supported and implemented and the IAEA's capability to detect undeclared nuclear activities should be increased. Also States not Party to the Treaty on the Non-Proliferation of Nuclear Weapons should be urged to enter into comprehensive safeguards agreements with the IAEA.

12. New supply arrangements for the transfer of source or special fissionable material or equipment or material especially designed or prepared for the processing, use or production of special fissionable material to non-nuclear weapon States should require, as a necessary precondition, acceptance of IAEA full-scope safeguards and internationally legally binding commitments not to acquire nuclear weapons or other nuclear explosive devices.

13. Nuclear fissile material transferred from military use to peaceful nuclear activities should, as soon as practicable, be placed under IAEA safeguards in the framework of the voluntary safeguards agreements in place with the nuclear-weapon States. Safeguards should be universally applied once the complete elimination of nuclear weapons has been achieved."

"19. Every effort should be made to ensure that the IAEA has the financial and human resources necessary in order to meet effectively its responsibilities in the areas of technical co-operation, safeguards and nuclear safety."

Annex 2

Growth in the number of States having safeguards agreements in force with the Agency

	1975	1980	1985	1990	1995	1999
Total number of States with safeguards agreements in force	64	86	96	104	125	139
Total number of States with NPT safeguards agreements in force*	46	69	78	86	108	127
Total number of safeguards agreements in force	106	139	163	177	207	223
Total number of NPT safeguards agreements in force*	46	65	74	81	101	118

* The number of States with NPT safeguards agreements is higher than the number of NPT safeguards agreements, inter alia, because the NNWSs of the European Union have collectively one safeguards agreement.

SITUATION ON 31 DECEMBER 1999 WITH RESPECT TO THE CONCLUSION OF SAFEGUARDS AGREEMENTS BETWEEN THE AGENCY AND NON-NUCLEAR-WEAPON STATES IN CONNECTION WITH NPT

Non-nuclear-weapon States which have signed, ratified, acceded to or succeeded to NPT[a] (1)	Date of ratification, accession or succession[a] (2)	Safeguards agreement with the Agency (3)	INFCIRC (4)
Afghanistan	4 February 1970	In force: 20 February 1978	257
Albania[b]	12 September 1990		
Algeria	12 January 1995	In force: 7 January 1997	531
Andorra	7 June 1996		
Angola	14 October 1996		
Antigua and Barbuda[c]	27 November 1968	In force: 9 September 1996	528
Argentina[d]	10 February 1995	In force: 18 March 1997	435/Mod.1
Armenia	15 July 1993	In force: 5 May 1994	455
Australia	23 January 1973	In force: 10 July 1974	217
Austria[e]	27 June 1969	Accession: 31 July 1996	193
Azerbaijan	22 September 1992	In force: 29 April 1999	580
Bahamas[c]	10 July 1973	In force: 12 September 1997	544
Bahrain	3 November 1988		
Bangladesh	31 August 1979	In force: 11 June 1982	301
Barbados[c]	21 February 1980	In force: 14 August 1996	527
Belarus	22 July 1993	In force: 2 August 1995	495
Belgium	2 May 1975	In force: 21 February 1977	193
Belize[f]	9 August 1985	In force: 21 January 1997	532
Benin	31 October 1972		
Bhutan	23 May 1985	In force: 24 October 1989	371
Bolivia[c]	26 May 1970	In force: 6 February 1995	465
Bosnia and Herzegovina[g]	15 August 1994	In force: 28 December 1973	204
Botswana	28 April 1969		
Brazil[h]	18 September 1998	In force: 20 September 1999	435/Mod. 3
Brunei Darussalam	26 March 1985	In force: 4 November 1987	365
Bulgaria	5 September 1969	In force: 29 February 1972	178
Burkina Faso	3 March 1970		
Burundi	19 March 1971		
Cambodia	2 June 1972	Signed: 17 December 1999	
Cameroon	8 January 1969	Signed: 21 May 1992	
Canada	8 January 1969	In force: 21 February 1972	164
Cape Verde	24 October 1979		
Central African Republic	25 October 1970		
Chad	10 March 1971		
Chile[i]	25 May 1995	In force: 9 September 1996	476/Mod.1
Colombia[j]	8 April 1986		
Comoros	4 October 1995		
Congo	23 October 1978		
Costa Rica[c]	3 March 1970	In force: 22 November 1979	278
Côte d'Ivoire	6 March 1973	In force: 8 September 1983	309
Croatia	29 June 1992	In force: 19 January 1995	463
Cyprus	10 February 1970	In force: 26 January 1973	189
Czech Republic[k]	1 January 1993	In force: 11 September 1997	541
Democratic People's Republic of Korea	12 December 1985	In force: 10 April 1992	403
Democratic Republic of the Congo	4 August 1970	In force: 9 November 1972	183
Denmark[l]	3 January 1969	In force: 21 February 1977	193
Djibouti	16 October 1996		
Dominica[f]	10 August 1984	In force: 3 May 1996	513
Dominican Republic[c]	24 July 1971	In force: 11 October 1973	201
Ecuador[c]	7 March 1969	In force: 10 March 1975	231
Egypt	26 February 1981	In force: 30 June 1982	302
El Salvador[c]	11 July 1972	In force: 22 April 1975	232
Equatorial Guinea	1 November 1984	Approved by the Board, June 1986	
Eritrea	16 March 1995		
Estonia	7 January 1992	In force: 24 November 1997	547
Ethiopia	5 February 1970	In force: 2 December 1977	261

Fiji	14 July 1972	In force: 22 March 1973	192
Finland[m]	5 February 1969	Accession: 1 October 1995	193
Gabon	19 February 1974	Signed: 3 December 1979	
Gambia	12 May 1975	In force: 8 August 1978	277
Georgia	7 March 1994	Signed: 29 September 1997	
Germany[n]	2 May 1975	In force: 21 February 1977	193
Ghana	4 May 1970	In force: 17 February 1975	226
Greece[o]	11 March 1970	Accession: 17 December 1981	193
Grenada[c]	19 August 1974	In force: 23 July 1996	525
Guatemala[c]	22 September 1970	In force: 1 February 1982	299
Guinea	29 April 1985		
Guinea-Bissau	20 August 1976		
Guyana[c]	19 October 1993	In force: 23 May 1997	543
Haiti[c]	2 June 1970	Signed: 6 January 1975	
Holy See	25 February 1971	In force: 1 August 1972	187
Honduras[c]	16 May 1973	In force: 18 April 1975	235
Hungary	27 May 1969	In force: 30 March 1972	174
Iceland	18 July 1969	In force: 16 October 1974	215
Indonesia	12 July 1979	In force: 14 July 1980	283
Iran, Islamic Republic of	2 February 1970	In force: 15 May 1974	214
Iraq	29 October 1969	In force: 29 February 1972	172
Ireland	1 July 1968	In force: 21 February 1977	193
Italy	2 May 1975	In force: 21 February 1977	193
Jamaica[c]	5 March 1970	In force: 6 November 1978	265
Japan	8 June 1976	In force: 2 December 1977	255
Jordan	11 February 1970	In force: 21 February 1978	258
Kazakhstan	14 February 1994	In force: 11 August 1995	504
Kenya	11 June 1970		
Kiribati	18 April 1985	In force: 19 December 1990	390
Korea, Republic of	23 April 1975	In force: 14 November 1975	236
Kuwait	17 November 1989	Signed: 10 May 1999	
Kyrgyzstan	5 July 1994	Signed: 18 March 1998	
Lao People's Democratic Republic	20 February 1970	Signed: 22 November 1991	
Latvia	31 January 1992	In force: 21 December 1993	434
Lebanon	15 July 1970	In force: 5 March 1973	191
Lesotho	20 May 1970	In force: 12 June 1973	199
Liberia	5 March 1970		
Libyan Arab Jamahiriya	26 May 1975	In force: 8 July 1980	282
Liechtenstein	20 April 1978	In force: 4 October 1979	275
Lithuania	23 September 1991	In force: 15 October 1992	413
Luxembourg	2 May 1975	In force: 21 February 1977	193
Madagascar	8 October 1970	In force: 14 June 1973	200
Malawi	18 February 1986	In force: 3 August 1992	409
Malaysia	5 March 1970	In force: 29 February 1972	182
Maldives	7 April 1970	In force: 2 October 1977	253
Mali	10 February 1970		
Malta	6 February 1970	In force: 13 November 1990	387
Marshall Islands	30 January 1995		
Mauritania	26 October 1993		
Mauritius	8 April 1969	In force: 31 January 1973	190
Mexico[c]	21 January 1969	In force: 14 September 1973	197
Micronesia, Federated States of	14 April 1995		
Monaco	13 March 1995	In force: 13 June 1996	524
Mongolia	14 May 1969	In force: 5 September 1972	188
Morocco	27 November 1970	In force: 18 February 1975	228
Mozambique	4 September 1990		
Myanmar	2 December 1992	In force: 20 April 1995	477
Namibia	2 October 1992	In force: 15 April 1998	551
Nauru	7 June 1982	In force: 13 April 1984	317
Nepal	5 January 1970	In force: 22 June 1972	186
Netherlands[p]	2 May 1975	In force: 21 February 1977	193
New Zealand[q]	10 September 1969	In force: 29 February 1972	185
Nicaragua[c]	6 March 1973	In force: 29 December 1976	246
Niger	9 October 1992		
Nigeria	27 September 1968	In force: 29 February 1988	358
Norway	5 February 1969	In force: 1 March 1972	177
Oman	23 January 1997	Approved by the Board	

		20 September 1999	
Palau, Republic of	14 April 1995		
Panama[c,f]	13 January 1977	Signed: 22 December 1988	
Papua New Guinea	13 January 1982	In force: 13 October 1983	312
Paraguay[c]	4 February 1970	In force: 20 March 1979	279
Peru[c]	3 March 1970	In force: 1 August 1979	273
Philippines	5 October 1972	In force: 16 October 1974	216
Poland	12 June 1969	In force: 11 October 1972	179
Portugal[s]	15 December 1977	Accession: 1 July 1986	193
Qatar	3 April 1989		
Republic of Moldova	11 October 1994	Signed: 14 June 1996	
Romania	4 February 1970	In force: 27 October 1972	180
Rwanda	20 May 1975		
St. Kitts and Nevis[f]	22 March 1993	In force: 7 May 1996	514
St. Lucia[f]	28 December 1979	In force: 2 February 1990	379
St. Vincent and the Grenadines[f]	6 November 1984	In force: 8 January 1992	400
Samoa	17 March 1975	In force: 22 January 1979	268
San Marino	10 August 1970	In force: 21 September 1998	575
São Tome and Principe	20 July 1983		
Saudi Arabia	3 October 1988		
Senegal	17 December 1970	In force: 14 January 1980	276
Seychelles	12 March 1985		
Sierra Leone	26 February 1975	Signed: 10 November 1977	
Singapore	10 March 1976	In force: 18 October 1977	259
Slovakia[t]	1 January 1993	In force: 3 March 1972	173
Slovenia	7 April 1992	In force: 1 August 1997	538
Solomon Islands	17 June 1981	In force: 17 June 1993	420
Somalia	5 March 1970		
South Africa	10 July 1991	In force: 16 September 1991	394
Spain	5 November 1987	Accession: 5 April 1989	193
Sri Lanka	5 March 1979	In force: 6 August 1984	320
Sudan	31 October 1973	In force: 7 January 1977	245
Suriname[c]	30 June 1976	In force: 2 February 1979	269
Swaziland	11 December 1969	In force: 28 July 1975	227
Sweden[u]	9 January 1970	Accession: 1 June 1995	193
Switzerland	9 March 1977	In force: 6 September 1978	264
Syrian Arab Republic	24 September 1969	In force: 18 May 1992	407
Tajikistan	17 January 1995		
Thailand	7 December 1972	In force: 16 May 1974	241
The Former Yugoslav Republic of Macedonia	30 March 1995		
Togo	26 February 1970	Signed: 29 November 1990	
Tonga	7 July 1971	In force: 18 November 1993	426
Trinidad and Tobago[c]	30 October 1986	In force: 4 November 1992	414
Tunisia	26 February 1970	In force: 13 March 1990	381
Turkey	17 April 1980	In force: 1 September 1981	295
Turkmenistan	29 September 1994		
Tuvalu	19 January 1979	In force: 15 March 1991	391
Uganda	20 October 1982		
Ukraine	5 December 1994	In force: 22 January 1998	550
United Arab Emirates	26 September 1995		
United Republic of Tanzania	31 May 1991	Signed: 26 August 1992	
Uruguay[c]	31 August 1970	In force: 17 September 1976	157
Uzbekistan	7 May 1992	In force: 8 October 1994	508
Vanuatu	24 August 1995		
Venezuela[c]	25 September 1975	In force: 11 March 1982	300
Viet Nam	14 June 1982	In force: 23 February 1990	376
Yemen, Republic of	1 June 1979		
Yugoslavia[v], Federal Republic of	4 March 1970	In force: 28 December 1973	204
Zambia	15 May 1991	In force: 22 September 1994	456
Zimbabwe	26 September 1991	In force: 26 June 1995	483

[a] The information in columns (1) and (2) was provided to the Agency by depositary governments of NPT, and an entry in column (1) does not imply the expression of any opinion on the part of the Secretariat concerning the legal status of any country or territory or of

its authorities, or concerning the delimitation of its frontiers. The table does not contain information relating to the participation of Taiwan, China, in NPT.

b

A sui generis comprehensive safeguards agreement with Albania entered into force on 25 March 1988 (INFCIRC/359).

c

The relevant safeguards agreement refers to both NPT and the Treaty of Tlatelolco.

d

An exchange of letters has taken place between Argentina and the Agency confirming that the safeguards agreement concluded between Argentina, Brazil, ABACC and the Agency for the application of safeguards which entered into force on 4 March 1994 (INFCIRC/435) satisfies the requirements of Argentina under Article III of the NPT to conclude a safeguards agreement with the Agency. The exchange of letters entered into force on the date of approval by the Board of Governors.

e

The application of safeguards in Austria under the NPT safeguards agreement INFCIRC/156, in force since 23 July 1972, was suspended on 31 July 1996, on which date the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency, to which Austria had acceded, entered into force for Austria.

f

An exchange of letters has taken place between this State and the Agency confirming that the NPT safeguards agreement concluded with the State satisfies the obligations of the State under Article 13 of the Treaty of Tlatelolco to conclude a safeguards agreement with the Agency.

g

The NPT safeguards agreement concluded with the Socialist Federal Republic of Yugoslavia (INFCIRC/204), which entered into force on 28 December 1973, continues to be applied in Bosnia and Herzegovina to the extent relevant to the territory of Bosnia and Herzegovina.

h

The Board of Governors has concluded that the agreement between Argentina, Brazil, the ABACC and the Agency for the application of safeguards which entered into force on 4 March 1994 (INFCIRC/435) is compatible with the Treaty of Tlatelolco and the NPT.

i

An exchange of letters has taken place between this State and the Agency confirming that the safeguards agreement concluded with the State pursuant to the Treaty of Tlatelolco satisfies the requirements of the obligations of the State under Article III of the NPT to conclude a safeguards agreement with the Agency. The exchange of letters entered into force on the date of approval by the Board of Governors.

j

A comprehensive safeguards agreement with Colombia concluded pursuant to the Treaty of Tlatelolco entered into force on 22 December 1982 (INFCIRC/306).

k

The NPT safeguards agreement concluded with the Czechoslovak Socialist Republic (INFCIRC/173), which entered into force on 3 March 1972, continued to be applied in the Czech Republic to the extent relevant to the territory of the Czech Republic until 11 September 1997, on which date the NPT safeguards agreement concluded with the Czech Republic entered into force.

l

The NPT safeguards agreement with Denmark (INFCIRC/176), in force since 1 March 1972, has been replaced by the agreement of 5 April 1973 between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency (INFCIRC/193) but still applies to the Faroe Islands. Upon Greenland's secession from EURATOM as of 31 January 1985, the Agreement between the Agency and Denmark (INFCIRC/176) re-entered into force as to Greenland.

m

The application of safeguards in Finland under the NPT safeguards agreement INFCIRC/155, in force since 9 February 1972, was suspended on 1 October 1995, on which date the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency, to which Finland had acceded, entered into force for Finland.

n

The NPT safeguards agreement of 7 March 1972 concluded with the German Democratic Republic (INFCIRC/181) is no longer in force with effect from 3 October 1990, on which date the German Democratic Republic acceded to the Federal Republic of Germany.

o

The application of safeguards in Greece under the NPT safeguards agreement INFCIRC/166, provisionally in force since 1 March 1972, was suspended on 17 December 1981, on which date Greece acceded to the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency.

p

An agreement had also been concluded in respect of the Netherlands Antilles (INFCIRC/229). This agreement entered into force on 5 June 1975.

q

The NPT safeguards agreement with New Zealand (INFCIRC/185) also applies to Cook Islands, Niue and Tokelau.

r

A comprehensive safeguards agreement with Panama concluded pursuant to the Treaty of Tlatelolco entered into force on 23 March 1984 (INFCIRC/316).

s

The application of safeguards in Portugal under the NPT safeguards agreement INFCIRC/272, in force since 14 June 1979, was suspended on 1 July 1986, on which date Portugal acceded to the agreement of 5 April 1973 (INFCIRC/193) between the non-nuclear-weapon States of EURATOM, EURATOM and the Agency.

t

The NPT safeguards agreement concluded with the Czechoslovak Socialist Republic (INFCIRC/173), which entered into force on 3 March 1972, continues to be applied in Slovakia to the extent relevant to the territory of Slovakia. A new NPT safeguards agreement concluded with Slovakia was approved by the Board of Governors on 14 September 1998.

u

The application of safeguards in Sweden under the NPT safeguards agreement INFCIRC/234, in force since 14 April 1975, was suspended on 1 June 1995, on which date the agreement of 5 April 1973 (INFCIRC/193) between the non- nuclear-weapon States of EURATOM, EURATOM and the Agency, to which Sweden had acceded, entered into force for Sweden.

v

The NPT safeguards agreement concluded with the Socialist Federal Republic of Yugoslavia (INFCIRC/204), which entered into force on 28 December 1973, continues to be applied in the Federal Republic of Yugoslavia to the extent relevant to the territory of the Federal Republic of Yugoslavia.

Annex 4

Situation on 31 December 1999 with respect to the conclusion of Additional Protocols

State	Board Approval	Signed	Entered into force
Armenia	9-23-97	9-29-97	
Australia	9-23-97	9-23-97	12-12-97
Austria	6-11-98		
Belgium[1]	6-11-98	9-22-98	
Bulgaria	9-14-98	9-24-98	
Canada	6-11-98	9-24-98	
China	11-25-98	12-31-98	
Croatia	9-14-98	9-22-98	
Cuba	9-20-99	10-15-99	
Cyprus	11-25-98	7-29-99	
Czech Republic	9-20-99	9-28-99	
Denmark[1]	6-11-98	9-22-98	
Ecuador	9-20-99	10-1-99	
Finland[1]	6-11-98	9-22-98	
France[1]	6-11-98	9-22-98	
Georgia	9-23-97	9-29-97	
Germany[1]	6-11-98	9-22-98	
Ghana	6-11-98	6-12-98	*provisional*
Greece[1]	6-11-98	9-22-98	
Holy See	9-14-98	9-24-98	9-24-98
Hungary	9-25-98	11-26-98	
Indonesia	9-20-99	9-29-99	9-29-99
Ireland	6-11-98	9-22-98	
Italy[1]	6-11-98	9-22-98	
Japan	6-11-98	12-09-98	12-16-99
Jordan	3-18-98	7-28-98	7-28-98
Latvia	12-01-97	3-11-98	
Luxembourg[1]	6-11-98	9-22-98	
Monaco	11-26-98	9-30-99	9-30-99
Netherlands[1]	6-11-98	9-22-98	

Norway	3-24-99	9-29-99	
Philippines	9-23-97	9-30-97	
Portugal[1]	6-11-98	9-22-98	
Romania	6-9-99	6-11-99	
Slovenia	11-25-98	11-26-98	
Sweden[1]	6-11-98	9-22-98	
US	6-11-98	6-12-98	
Uzbekistan	9-14-98	9-22-98	12-21-98
Totals	**46**	**45**	**8**

[1]All 15 EU States have concluded APs with EURATOM and the Agency

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Activities of the International Atomic Energy Agency Relevant to Article IV of the Treaty on the Non-Proliferation of Nuclear Weapons

EXECUTIVE SUMMARY

The International Atomic Energy Agency (IAEA) was established in 1957 to be the global intergovernmental organization for international co-operation in the peaceful uses of atomic energy. It is an independent organization within the United Nations family with 130 Member States.

While the IAEA is not referred to in Article IV of the NPT, under its Statute it in fact plays a major role in the organization and implementation of the multilateral co-operation stipulated by the Treaty. The Statute authorizes the IAEA, for peaceful purposes to — inter alia — encourage and assist research on, and development and practical application of, atomic energy; make provision for materials, services, equipment and facilities for atomic energy research and development; foster the exchange of scientific and technical information, and encourage training; and establish and administer safeguards.

The paper describes how, in line with its Statute and with decisions of its Policy-making organs, since 1979 the IAEA has placed increasing emphasis on technology transfer, with priority given to developing Member States. Both the Regular Budget of the IAEA and its Technical Co-operation Fund (TCF) are used for this purpose. The TCF funds the Technical Co-operation programme, which comprises national, or country, projects, and regional and inter-regional projects. They cover a wide spectrum of the IAEA's activities, for example those in nuclear, radiation, waste and transport safety and in nuclear energy, and also nuclear applications in medicine, agriculture, environment, hydrology and industry.

Resources for this technology transfer, which had increased in past decades, have levelled off in the past five years. At the same time, the IAEA's membership increased from 122 in 1995 to 130 in 1999, which in practical terms signifies a reduction in the capacity to respond to the increasing needs of its Member States. Much has been accomplished, but much more remains to be done to make the benefits of nuclear energy widely available for sustainable development, for environmental protection, for human health and for generally improving the quality of life. Opportunities exist and projects responding to the real needs of Member States have been identified, the only constraint being the level of resources available. The unpredictability of resources for the TCF makes it difficult to programme activities. Indeed, over the last few years, some major donors pledged only a part (20%—80%) of their respective targets, while some recipient countries did not pay at all. The General Conference of the IAEA has often stressed the need to strengthen TC activities, partly through the provision of sufficient resources, and has urged all Member States to make every effort to pay their contributions to the TCF in full and on time. In this respect, the provisions of Article IV.2 are relevant and should be seriously considered by the States Party to the NPT at this Review Conference.

The paper concludes by examining the challenges to technical co-operation, and how the IAEA has developed a Medium Term Strategy (2001-2005) to meet those challenges. In this Strategy the objectives for the medium term are grouped under three substantive goals, or pillars, and two complementary functional goals. They address the contribution of nuclear technologies to meeting the needs and interests of Member States in a sustainable manner; promoting an effective worldwide safety culture, and providing assurances to the international community of the peaceful uses of nuclear material.

The IAEA is thus expected, through its Medium Term Strategy, to strengthen its role as the principal international vehicle for multilateral co-operation in the peaceful uses of atomic energy, maintaining and enhancing its relevance to Article IV of the NPT.

I. INTRODUCTION

The International Atomic Energy Agency (IAEA) was established in 1957 as an independent organization within the United Nations family, to be the global intergovernmental organization for international co-operation in the peaceful use of nuclear energy. The twin objectives of the IAEA are: (i) to enlarge the contribution of atomic energy to peace and development at a high level of safety, and (ii) to ensure, so far as it is able, that atomic energy is utilized exclusively for peaceful purposes.

The IAEA now has 130 Member States.

As the needs and priorities of the IAEA Member States are diverse, the IAEA deals with the whole spectrum of peaceful uses of nuclear energy, ranging from production of electricity through nuclear power to the application of radiation and isotopes in such areas as human health, food and agriculture, industry, water resource management and environment, thus affecting all aspects of human development.

Priority within the IAEA's activities is placed on the transfer of nuclear technology and techniques to Member States, with emphasis on developing countries. Many ways and means are used to this end under its regular programme, including scientific and technical meetings and publications, research contracts and programmes, numerous databases, and a wide range of services by advisory teams and research laboratories. The majority of the IAEA technology transfer activities, however, are undertaken through the technical co-operation (TC) programme, funded by voluntary contributions, which assists developing Member States in meeting their most pressing scientific and technical needs for development.

A number of steps have been taken by the IAEA in recent years to strengthen its technology transfer efforts by improving its efficiency and effectiveness. This paper presents an overview of the IAEA's technology transfer activities and briefly comments on the link between these activities and the commitments made under Article IV by the parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). The following sections contain a description of the relationship between Article IV of the NPT and the activities of the IAEA and the evolving framework for the IAEA activities to promote peaceful nuclear co-operation, with a special section devoted to developments since 1995. The last section focuses on the challenges to peaceful co-operation as described in the medium term strategy of the IAEA for 2001-2005.

II. INTERNATIONAL CO-OPERATION FOR THE PEACEFUL USES OF NUCLEAR ENERGY: THE NPT AND THE IAEA

A. NPT Article IV

Article IV of the NPT states:

1. "Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty."

2. "All the parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also co-operate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States party to the Treaty, with due consideration for the needs of the developing areas of the world."

B. Responsibilities of States Parties

As such, Article IV of the NPT stipulates two main provisions. First, it confirms the right of all the parties to the Treaty to conduct peaceful nuclear activities and to participate in peaceful nuclear co-operation. Second, the Article provides for the obligation of the parties to facilitate the fullest possible exchange of equipment, materials, scientific and technological information and co-operate in contributing to the further development of the peaceful uses of nuclear energy. Particular emphasis is placed on the development of peaceful nuclear applications in non-nuclear-weapon States party to the NPT.

C. Role of the IAEA: The Statute

Although the Agency is not referred to in Article IV of the NPT, it plays a major role in the organization and implementation of the multilateral co-operation stipulated by the Treaty. The importance of the work of the IAEA as the principal agent for technology transfer among international organizations referred to in Article IV.2, was acknowledged by the 1995 NPT Review and Extension Conference. The document of this Conference, NPT/CONF.1995/32/DEC.2 of 11 May 1995 entitled 'The Principles and Objectives of Nuclear Non-proliferation and Disarmament' states that:

> "Every effort should be made to ensure that the IAEA has the financial and human resources necessary in order to meet effectively its responsibilities in the areas of technical co-operation, safeguards and nuclear safety. The IAEA should be encouraged to intensify its efforts aimed at finding ways and means for funding technical assistance through predictable and assured resources."

Under its Statute, the IAEA's principal objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world". To this end, the IAEA is authorized to discharge a number of functions, including the following:

1. "To encourage and assist research on, and development and practical application of, atomic energy for peaceful uses throughout the world; and, if requested to do so, to act as an intermediary for the purposes of securing the performance of services or the supplying of materials, equipment, or facilities by one member of the IAEA for another; and to perform any operation or service useful in research on, or development or practical application of, atomic energy for peaceful purposes;

2. To make provision for materials, services, equipment and facilities to meet the needs for research on, and development and practical application of, atomic energy for peaceful purposes, including the production of electric power, with due consideration for the needs of underdeveloped areas of the world;

3. To foster the exchange of scientific and technical information on peaceful uses of atomic energy;

4. To encourage the exchange and training of scientists and experts in the field of peaceful uses of atomic energy;

5. To establish and administer safeguards designed to ensure that special fissionable and other materials, services, equipment, facilities, and information made available by the IAEA or at its request or under its supervision or control are not used in such a way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or at the request of a State, to any of that State's activities in the field of atomic energy."

Over the years, some of the foregoing statutory provisions were further built upon and detailed. In 1979, the Board of Governors approved "The Revised Guiding Principles and General Operating Rules to Govern the Provision of Technical Assistance by the IAEA", which reflected the experience accumulated by the IAEA in this area. The document emphasized *inter alia* that:

1. The provision of technical assistance constitutes a major, high-priority function of the IAEA, and responsibility for its success devolves on all Departments of the Secretariat.

2. Increasing emphasis shall be given by the IAEA to the provision of technical assistance with regard to integrated, multi-year programmes, including projects for regional development. These programmes or projects should be related to the development plans or priorities and objectives of the recipient Member States or group of Member States with a view to making a contribution in support of them.

The aforementioned statutory provisions and subsequent decisions of the Board of Governors underlie the "Revised Supplementary Agreement concerning the Provision of Technical Assistance by the International Atomic Energy Agency" (RSA) which all recipient Member States

must conclude with the IAEA. This supplementary agreement reinforces the commitment of these Member States to non-proliferation.

III. THE EVOLVING FRAMEWORK FOR PROMOTION OF PEACEFUL NUCLEAR CO-OPERATION

A. IAEA infrastructure, nuclear centres and laboratories

For effective promotional activities, the IAEA must monitor the trends and developments in nuclear science and technology worldwide, as well as the prevailing needs and priorities of Member States. The IAEA conducts comprehensive reviews of its programmes with a view to identifying their strengths and weaknesses. The latest such review was undertaken in 1998 in connection with the elaboration of the Medium Term Strategy for 2001-2005. In addition, since 1982 Technical Co-operation Review Seminars have been held at an interval of 4-5 years where all IAEA Member States can present their views and proposals on principal issues related to TC activities. In many cases, such reviews and discussions have resulted in adjustments of the IAEA's strategy, priorities and programmes and in attendant modifications of its organizational structure.

At present, the IAEA Secretariat is composed of six Departments. Four are directly involved in the transfer of peaceful nuclear technology worldwide. The overall administration and management of technical co-operation programme is carried out by the Department of Technical Co-operation. Its functions include the whole range of organizational and financial matters related to the planning and implementation of the programme; forging a link between national development goals of recipient countries and the IAEA's assistance; communication and interaction with national authorities in developing Member States on TC matters; and overall performance and improvement of TC activities.

The other Departments' involvement in the TC programme includes scientific and technical aspects of country programming, technical appraisal of project requests, scientific and technical supervision of project implementation, and other tasks aimed at ensuring the technical integrity of inputs and the technical quality of the programme. In addition to their input to the TC programme, the Technical Departments conduct, under their own programmes, extensive activities directed at nuclear science and technology transfer to Member States. A number of mechanisms have been developed and used to this end, including co-ordinated research projects (CRPs), research contracts, seminars and workshops, the collection and dissemination of scientific and technical information through the International Nuclear Information System (INIS) and various databases, the preparation of safety standards, the provision of advisory services, and other means of exchange of knowledge and skills between scientists and engineers from all IAEA Member States, regardless of the level of their nuclear development.

Uniquely among other international organizations of the UN family, the IAEA operates its own research and service laboratories, which contribute significantly to the transfer of nuclear technologies. For nearly 40 years, the IAEA's Seibersdorf Laboratories, near Vienna, have carried out research and provided a diverse range of technical services in applied physics, chemistry, hydrology, agriculture, and nuclear instrumentation.

Hundreds of scientists from developing countries benefit every year from the activities of the International Centre for Theoretical Physics (ICTP) in Trieste, Italy, which is financed jointly by the Italian Government, UNESCO and the IAEA, with additional funds from other sponsors. The centre serves both as a research facility and a scientific training centre. The IAEA's main objective in ICTP's activities is to foster the growth of advanced studies and research in physical and mathematical sciences and their interface with technology, especially in developing countries.

Since 1961, the IAEA has operated a Marine Environment Laboratory in Monaco which carries out research and training in marine science, particularly in environmental monitoring and in the study of radioactive and non-radioactive pollutants in oceans and seas. The laboratory frequently collaborates with oceanographic institutes worldwide and undertakes projects in co-operation with other international environmental programmes and institutions.

B. Financial resources and personnel

The IAEA financial resources consist of two major components: the Regular Budget and the Technical Co-operation Fund (TCF). The Regular Budget provides for the administrative expenses of all Departments of the IAEA, including the Technical Co-operation Department, as well as for activities carried out under the regular programme in the interest of all Member States, both industrialized and developing. The Regular Budget is funded by contributions made according to a formula of annual assessment applied to each Member State, calculated essentially according to the rates used in the UN system for assessed contributions. Safeguards expenses are included in the Regular Budget, although a special formula, designed to minimize costs to developing countries, is used for purposes of assessment. Figure 1 shows the regular programme resources available during the period 1995-1998. The TCF was established to finance all components delivered by the IAEA to developing countries under the TC programme and is made up of voluntary contributions paid by Member States (see subsection D below).

In addition to the Regular Budget and TCF, the IAEA receives extrabudgetary contributions from its Member States and some international organizations for funding specific projects within the TC programme and other programmes.

Over the years, the IAEA has built up significant human resources to enable it to cope with the growing size and diversity of technology transfer to developing Member States. The managerial and technical staff dealing with these activities are qualified and dedicated specialists with substantial experience in the international transfer of technology and know-how. Many of them come from developing countries, bringing with them knowledge of prevailing conditions and needs in those regions.

As of the end of 1999, IAEA staff numbered 2,196, of whom 940 were in the Professional and higher categories.

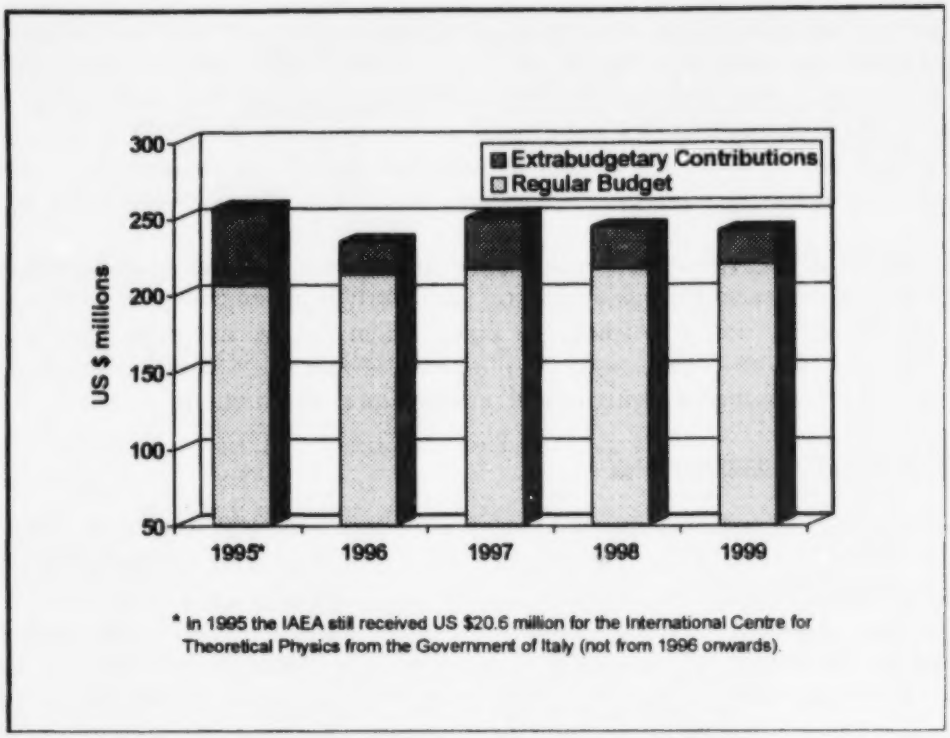

Figure 1. IAEA regular programme resources: 1995 - 1999.

C. Technical co-operation

The IAEA's major instrument for co-operation with developing countries is the TC programme. It comprises national projects (also known as country projects), regional projects and interregional projects. Projects may include one or more of the following components: expert services, provision of equipment and materials, fellowship training, scientific visits and training courses. A national project derives from a formal request for technical assistance by a Member State and forms part of the Member State's country programme of co-operation with the IAEA. Regional projects are (i) those proposed by the IAEA in response to the expressed needs of two or more Member States in a region, and (ii) those proposed by Member States in a region collaborating within a regional co-operative agreement. Interregional projects are established by the IAEA to serve the common needs of several Member States worldwide. In particular, some interregional projects are used to fund missions to any Member State that seeks assistance in planning its technical co-operation with the IAEA or in assessing needs for nuclear applications.

The TC programme is submitted for consideration and approval by the Board of Governors. Since 1989, the IAEA has applied a system of multi-year TC programmes with annual budgetary approval.

In 1999, 868 TC projects, including interregional and regional projects, were operational in 95 Member States, covering all areas of the peaceful application of nuclear energy. Under these

projects, over 3,300 experts including lecturers from all over the world conducted visits to recipient Member States, and 55% of these visits were carried out by experts from developing countries, which is an indicator of the advancement achieved by many developing Member States. Over 1,200 persons received training as fellows or visiting scientists. Fourteen interregional and 184 regional training courses were held in 65 countries; 82% of these courses were hosted by developing countries. Another 2,400 persons were trained at the courses. Various items of equipment and instruments totalling US $30 million were delivered. Figures 2 and 3 show disbursements by field of activity and a regional breakdown of the TC programme for 1998.

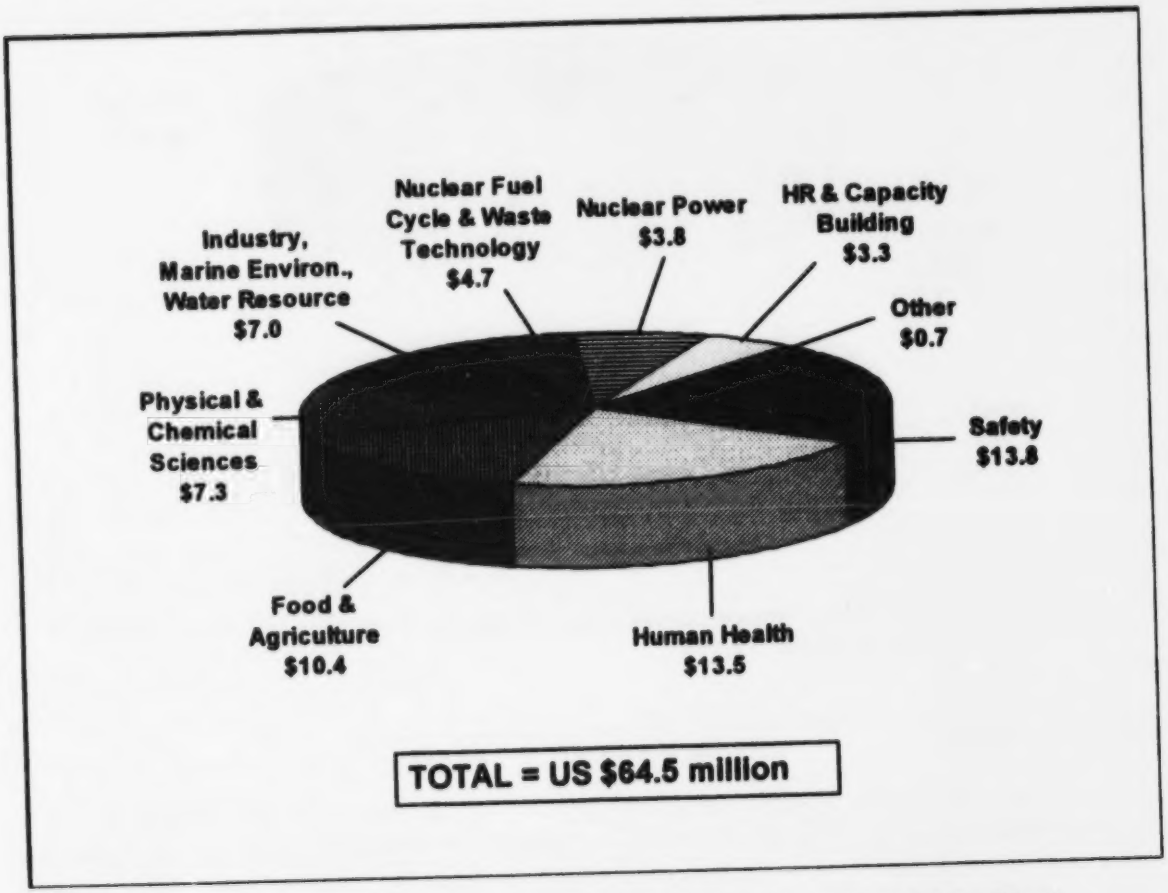
Nuclear Fuel Cycle & Waste Technology $4.7
Nuclear Power $3.8
HR & Capacity Building $3.3
Industry, Marine Environ., Water Resource $7.0
Other $0.7
Physical & Chemical Sciences $7.3
Safety $13.8
Food & Agriculture $10.4
Human Health $13.5
TOTAL = US $64.5 million

Figure 2. Technical co-operation disbursements by field of activity: 1998 (in US $ millions).

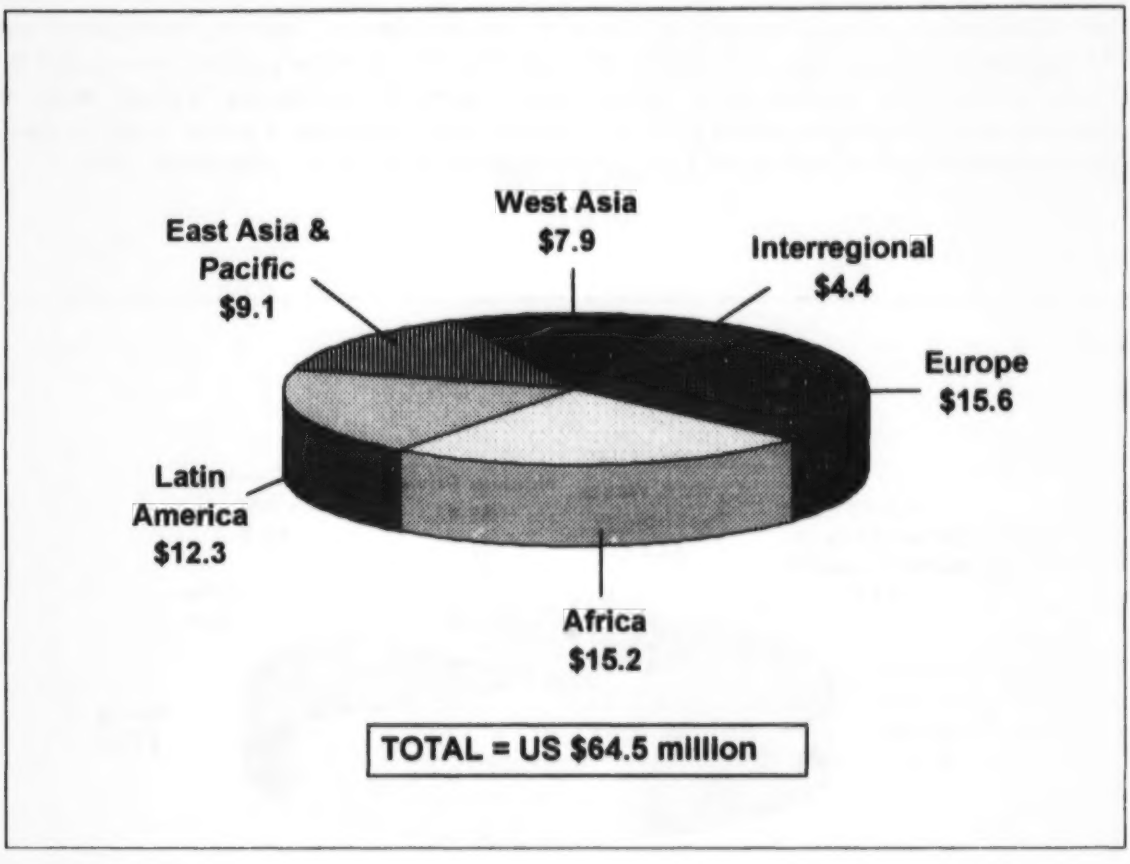

Figure 3. Technical Co-operation disbursements and Member States' participation by region: 1998 (US $ millions).

D. TC funding

As noted earlier, the administrative costs required for running the TC programme and its in-house technical support are borne by the Regular Budget. The cost of TC project components and their delivery is funded from voluntary contributions provided by Member States. Most of these voluntary contributions are paid into the TCF, accounting for over 85% of total resources available for the TC programme. The annual target for payments into the TCF is set for two years in advance following consultations among Member States. At the General Conference, Member States are requested to pledge contributions against their share of that target, calculated essentially according to the rates used in the UN system for assessed contributions. The other principal source of income for the TCF is Assessed Programme Costs (APC), which are levied on individual Member States at 8% of assistance received and paid back to the IAEA.

Guided by an annual estimate of available TCF resources, the Board of Governors approves the allocation of funds to projects according to priorities determined by the IAEA Secretariat following discussions with Member States.

A number of projects that cannot be funded from the TCF owing to lack of resources (typically 25-30% in funding terms) are approved for implementation subject to subsequent availability of funds which may be provided through extrabudgetary contributions ("footnote a/ projects"). Another type of extrabudgetary contributions is "assistance in kind", whereby Member States provide expert services, donate equipment or arrange training free of charge. Some 20% of all fellowships provided annually under the TC programme are funded from this source.

Figure 4 shows resources available (adjusted for inflation) for the TC programme in 1989-1998.

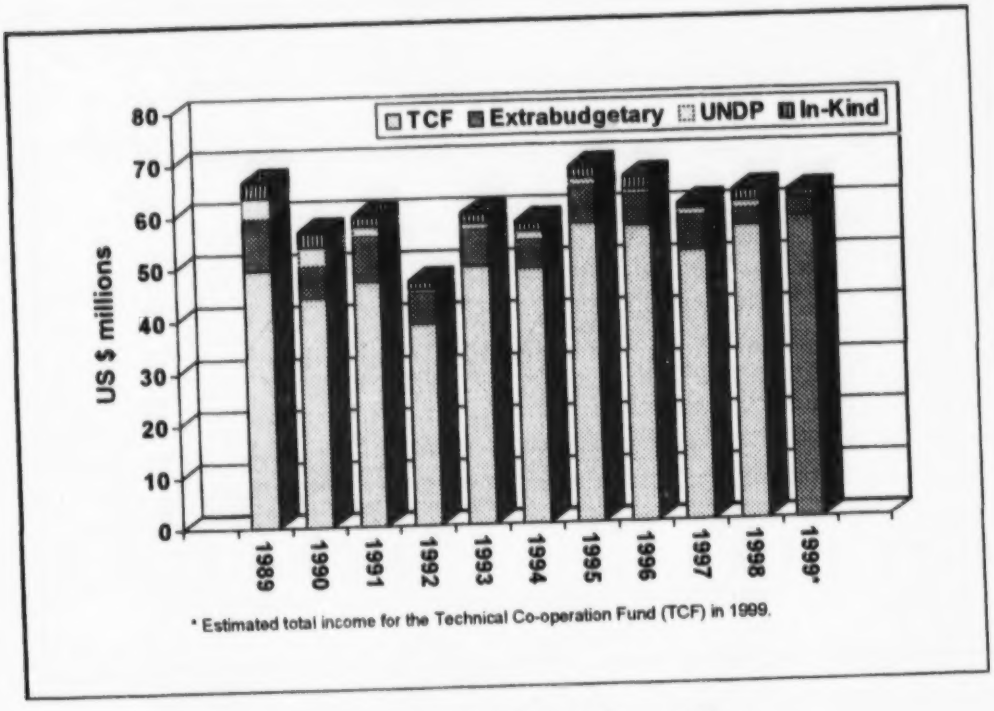

Figure 4. TC resources adjusted for inflation: 1989 — 1998.

A record number of 73 countries, 13 more than in 1997, made pledges to the TCF in 1998. Most of the newly pledging countries were among developing Member States, including least developed countries. The 20 largest contributors to the TCF (15 developed and five developing Member States) represent 95% of the payments for 1998. At the same time, 55 Member States neither pledged nor paid contributions to the TCF. Figure 5 shows the development of pledges and payments to the TCF during the period 1985-1998. It can be seen that during this period there was a continuous gap between the approved target for the fund payments and the actual payments.

Although the situation improved somewhat between 1992 and the time of the NPT Review and Extension Conference in 1995, since then the income as a percentage of the target has decreased again. At the same time the increase in the Agency membership from 122 in 1995 to 130 in 1999 signifies in practical terms a reduction in the capacity to respond to the increasing needs of its Member States. The unpredictability of resources for the TCF (see Figure 5) makes it difficult to programme activities. Indeed, over the last few years, some major donors pledged only a part (20%—80%) of their respective targets, while some recipient countries did not pay at all.

The General Conference of the IAEA has often stressed the need to strengthen TC activities, including the provision of sufficient resources, has urged all Member States to make every effort to pay their contributions to the TCF in full and on time, and has reminded Member States of their obligation to pay their Assessed Programme Costs (APC).

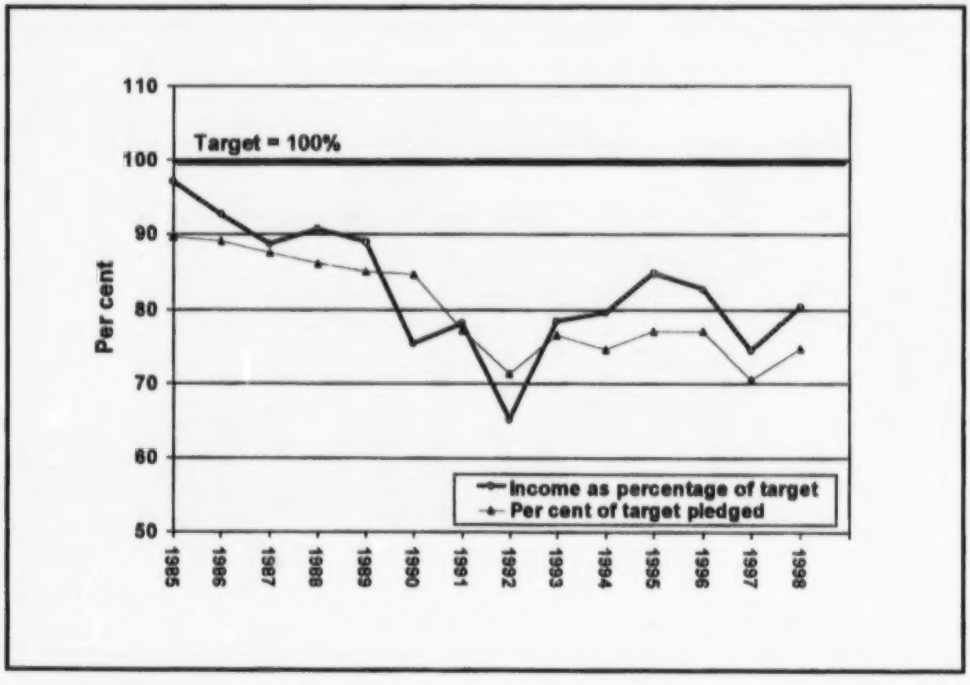

Figure 5. Pledges and payments to the Technical Co-operation Fund: 1985 - 1998.

E. TC and the NPT

While transfer of technology in the context of Article IV of the NPT also takes place through bilateral and other multilateral channels, the IAEA serves as the key international mechanism for scientific and technical co-operation in the peaceful uses of nuclear energy and has an important role in the transfer of nuclear technology to the developing areas of the world.

All TC project requests presented by Member States are appraised by the IAEA exclusively against statutory and other established criteria, including technical and practical feasibility, national

developmental priorities, availability of required infrastructure in the recipient country, and long term benefit to end users. As noted above, most of the projects deemed to be qualified for assistance are funded from the TCF. The remaining qualified projects, for which funding from the TCF is unavailable, are incorporated in the proposed TC programme as candidates for extrabudgetary support (footnote a/ projects). Such support is traditionally provided by donor countries.

F. TC strategy

Since the very early years of the IAEA's existence, its TC activities have undergone various adjustments and modifications reflecting new trends and developments in nuclear science and technology worldwide, changing needs and priorities of developing Member States, growing diversity and size of the TC programme, and other factors.

A number of new concepts and approaches have been introduced in TC planning and implementation practice at various times. Through these initiatives, the IAEA has been able to improve efficiency in the transfer of nuclear technology and techniques to developing Member States. The cumulative effect of these efforts on the technical capability of recipient countries is significant. This, combined with the desire of Member States to further strengthen the efficiency and effectiveness of technology transfer activities, has created greater opportunity for projects in the development areas. To encourage this trend, it has been necessary to focus the resources available for technology transfer on activities which are both cost effective and aligned with national development priorities.

That has brought about a gradual shift in emphasis in the IAEA's TC programme in the last four years from infrastructure building activities towards collaboration with counterpart organizations to employ the available capacity for development projects.

The major goal of the new **Technical Co-operation Strategy**, approved by the Board of Governors in December 1997, can be stated as follows: Technical co-operation with the Member States shall increasingly promote tangible socioeconomic impact by contributing directly in a cost effective manner to the achievement of the major sustainable development priorities of each country. This goal is conveyed by the term **Partners in Development**, the idea being that the IAEA becomes a partner with each Member State, co-operating in the process of achieving sustainable development. Three principal tools are utilized to achieve the strategic goal: Model Projects; country programme frameworks (CPFs); and thematic plans.

The **Model Projects** elaborated by the IAEA and introduced in 1994 may be national, regional or interregional. In comparison with other TC projects, Model Projects emphasize (i) responding to a high priority national need; (ii) a major role being played by nuclear technology; (iii) significant and measurable end-user/end-beneficiary impact; (iv) much greater government commitment; and (v) sustainability beyond the life-cycle of the project itself. Model Projects form the core of the IAEA's TC programme being, for example, the central element in planning country programmes within the CPF. Furthermore, because of their success rate, the new strategy calls for Model Project standards to be extended to the entire TC programme. By 1999, 122 Model Projects were operational in 59 Member States.

A **country programme framework** is a document agreed on between a country and the IAEA, outlining their joint concept for future co-operation. The CPF focuses on the medium term (four to six years) and is regularly updated. It provides a total overview of the country's needs for nuclear technology and serves to ensure that the IAEA's collaboration with the country is coherent and cost effective.

To be effective, the CPF must become an integral part — and eventually the principal means — of the national process of formulating and screening projects. The CPF process, already introduced during the preparation of the TC programme for 1997-1998, was applied to all Member States during the preparation of the 1999-2000 TC programme.

The second main pre-programme activity is **thematic planning for technical co-operation.** Thematic planning is a management tool for identifying those nuclear techniques which are unique or of special value in relation to the IAEA's mandate. A thematic plan should indicate (i) how IAEA expertise can contribute to solving a problem or to achieving a development objective, especially when compared with non-nuclear alternatives; (ii) in which countries or regions its application would be most appropriate; (iii) in which countries the ability to employ the services or applications exists, or can be readily created at reasonable cost. A strong link can be made between thematic planning and regional programmes. While thematic planning can result in national project activities, it can also help establish common regional strategies and opportunities for technical co-operation among developing countries (*TCDC*).

TCDC continues to be a key area because it strengthens the sustainability of project activities by building self-reliance and mutual interest among Member States. The most successful mechanisms established to stimulate TCDC are undoubtedly the Regional Co-operative Agreements for Asia (RCA), for Latin America (ARCAL) and for Africa (AFRA). The IAEA is trying to strengthen these regional endeavours by encouraging Member States to assume responsibility for project formulation activities, and by encouraging the more advanced national institutes within a region to contribute fully to solving problems within the region. Originally, such national institutes were referred to as **"centres of excellence".** However, given the way the concept is evolving, a more accurate term would be **"regional resource centres".**

The intensive efforts made by the IAEA and its Member States in recent years to strengthen TC activities have begun to bear fruit. More and more projects are aligned with recipient countries' priorities for economic and social development. This has been achieved by an increased emphasis on pre-project planning and consultations with Member States. Consequently, the IAEA is gaining a much higher profile not only with nuclear authorities but also with the heads of central government departments and ministers.

Consultations have also involved other potential partners and donors. For example, the European Union, the World Association of Nuclear Operators (WANO) and the G-24 participated in the planning of TC safety related activities for Eastern Europe and for the newly independent states (NIS) of the former USSR. This has led to increased funding for specific activities beyond that provided solely by the IAEA, and to greater co-ordination of multilateral efforts for the benefit of recipient States.

The total number of operational TC projects has been significantly reduced from nearly 1,200 projects in 1995 to slightly over 900 in 1998 and to 700 in 2000. Another interesting aspect is the growing trend towards "regionalization" of the TC programme, which means implementation through institutions within a region, using existing regional capacity and expertise whenever possible and thus promoting TCDC. In Africa, for example, while the budget for national TC projects has changed little in the past five years, allocations for AFRA and other regional projects have increased considerably, from about one quarter of the total programme budget in 1993 to over half in the TC programme for 1999-2000.

IV. PROMOTION OF PEACEFUL NUCLEAR CO-OPERATION: DEVELOPMENTS SINCE 1995.

A. Nuclear Technology Pillar

1. Nuclear power and the fuel cycle (including radioactive waste)

Global energy demand is growing as a result of economic development and increases in world population; for developing countries the demand is projected to increase two to threefold in the next thirty years. Nuclear power is one of the few options that can help countries in the next few decades to meet large scale electricity demand without releasing common environmental pollutants and greenhouse gases.

Today nuclear power is at a standstill in Western Europe and North America although it continues to expand in a few rapidly developing countries in Asia and parts of Eastern Europe. Accordingly, the proportional share of nuclear power in global electricity production is expected to fall in the next two decades. A resurgence of nuclear power depends on action on three crucial fronts: (i) continued improvement in its global safety record, including improvement in waste management; (ii) further improvement in its economic competitiveness; and (iii) restoration of public confidence.

While the choice of a particular energy mix is a national decision that can be made only in the light of national conditions and priorities, States considering the different energy options should be able to make that decision on the basis of up-to-date and complete information and with the benefit of technical expertise. In this context and in co-operation with eight other international organizations, the IAEA has continued its activities to assist Member States in developing their capacity for decision making in the energy sector. To that end, the IAEA's **nuclear power programme** has established country and technology databases, developed analytical computer tools, and provided training and support to developing countries in conducting comparative assessment studies, which make it possible to evaluate the perpetual trade-offs between technical, economic and environmental features of different electricity generation technologies, chains and systems at the national, regional and interregional levels. Currently, over ninety countries are using these tools, and more than 25 Member States have developed their own country databases containing a total of more than 2,500 technologies.

Under the programme, during the period 1995-1999 several international and regional conferences and seminars were organized and a number of technical documents dealing with

nuclear power planning and implementation were prepared by the IAEA. Of special interest to developing Member States was the publication of the following two documents: "Choosing the nuclear power option: Factors to be considered", and the report to the 43rd General Conference of the IAEA from the 2nd Scientific Forum on "Sustainable Development: A Role for Nuclear Power?".

The IAEA has also continued to provide Member States with information on the operation of nuclear power plants (NPPs) worldwide. In 1996, the Power Reactor Information System (PRIS) database was made available on the Internet, providing easier access to this information resource for the statistical analysis of NPP operation indicators. The number of PRIS users in 54 Member States and eight international organizations has increased to 280, representing a growth of 25% over the previous year.

A number of meetings have been held and a series of technical documents have been published by the IAEA on various aspects of **NPP performance**. They cover, in particular, NPP organization and staffing for improved performance, advanced methodologies used for training and qualification of NPP personnel, technical support for nuclear power operation, and good practices of some of the world's most productive plants.

Considerable efforts are being made worldwide to develop **advanced NPPs.** Expenditures for development of new designs, technology improvements, and the related research for the major reactor types combined are estimated to exceed US $1.5 billion per year. Within the framework of its nuclear power programme, the IAEA has continued to serve as an international clearing house for objective reference information on different concepts being developed and project status, as well as on typical development trends throughout the world. In this context, the IAEA plays a role in bringing together experts for a worldwide exchange of information on national programmes and for programme co-ordination of research on advanced reactor technology. For these activities, the IAEA relies on the advice of international working groups composed of leading representatives of national programmes and international organizations for each major type of reactor. Significant results of such meetings are published as technical documents and distributed to all interested organizations and individuals in Member States.

Among various types and new concepts of nuclear reactors, **small and medium size reactors**, which are of particular interest for such applications as the desalination of sea water and district heating, have continued to receive the IAEA's close attention. They may also be a suitable option for electricity generation in countries with small electricity grid capacities or in remotely located areas.

The IAEA's programme on the **nuclear fuel cycle** covers several key areas: uranium supply and demand, reactor fuel technology and performance, spent fuel management, and nuclear fuel cycle issues, including the safe handling and storage of plutonium and comparative assessment of the different options for the back end of the fuel cycle.

Some major assessments and their implications have emerged from this programme. The supply of uranium for nuclear power reactors will be sufficient to satisfy world needs up to the year 2050. Since delays are expected in the availability of high level waste and spent fuel

repositories, prolonged storage of spent fuel and conditioned high level waste is anticipated. However, technologies are available for safe storage and disposal of spent reactor fuel or radioactive waste. Also, a significant quantity of separated civil plutonium, which can be used for fueling power reactors, has been accumulated in the nuclear fuel cycle industry.

The IAEA's **waste management** activities are not limited to spent fuel and conditioned high level waste, but also deal with operational waste from nuclear power and its fuel cycle, and with radioactive waste from many other different sources. The majority of the IAEA's Member States do not have nuclear power programmes and use radionuclides principally for research, and for medical, industrial, and agricultural applications. Over the past decades, the technologies to effectively manage small amounts of radioactive wastes generated from non-power applications have been developed and implemented. Still, there are Member States where the available infrastructure is either inadequate or missing. In view of this, at present almost half of the IAEA's ongoing waste technology tasks are oriented to non-fuel cycle wastes. The main objective is to identify the best ways and means to transfer demonstrated technologies and associated experience to all countries, especially to developing IAEA Member States.

As for direct technology transfer, under the TC programme for 1998 a total of 110 projects in nuclear power and fuel cycle were operational, including regional and interregional activities. The disbursements for these projects amounted to nearly $ 8.5 million or 13% of total TC expenditures. The majority of these projects dealt with radioactive waste management and disposal (35%) followed by projects in nuclear power implementation and performance (33%) and raw materials for reactor fuels (15%).

2. Non-power applications of nuclear energy

The IAEA has continued co-operation with the overwhelming majority of its developing Member States in the use of radioisotopes and ionizing radiation for research, agricultural, medical, industrial and other non-power applications.

In the area of **food and agriculture,** emphasis is placed on facilitating the development and adoption by Member States of nuclear and related biotechnologies which enhance the ability at national and international levels to identify and alleviate constraints to sustainable food security. This activity is conducted jointly with the Food and Agricultural Organization (FAO).

The programme assists Member States in defining specific constraints and in finding solutions to problems in relevant areas earmarked for intergovernmental action at the United Nations Conference on Environment and Development and at the World Food Summit.

During 1998, nearly 180 projects in food and agriculture were operational under the TC programme, including one interregional and 15 regional projects. The disbursements for these projects accounted for 16% of total TC expenditures. The following examples illustrate some results obtained in the area of food and agriculture. About 125 new varieties of crops were developed by induced mutations to improve productivity in the past five years. Several Member States in Africa, Latin America and Europe have been very successful in the control or eradication

of insect pests by Sterile Insect Technique (SIT), and rinderpest has been almost eradicated from Africa.

In **human health,** IAEA activities are focused on nuclear medicine, clinical radiation therapy, dosimetry and medical physics, and on nutritional and health related environmental studies. In **nuclear medicine**, emphasis is placed on the introduction of cost effective application of many *in-vivo* diagnostic nuclear medicine procedures in routine medical practice in a large number of developing countries. More than 400 radioimmunoassay laboratories have received IAEA support. Molecular biology methods have been introduced in a number of centres. About 70 gamma cameras have been provided to 56 Member States and 150 existing analogue gamma cameras upgraded to digital ones. More than 700 nuclear medicine professionals have been trained. Over 200 national, regional and interregional training courses, workshops and seminars were organized during the past five years.

In **clinical radiation therapy**, the IAEA has been involved predominantly in selecting equipment, establishing training for all echelons of staff and identifying experts to start the first radiation oncology departments in four Member States. In **dosimetry** and **medical radiation physics**, major achievements have been the expansion of support to the IAEA/World Health Organization (WHO) network of secondary standard dosimetry laboratories: in particular, the calibration of brachytherapy, the development and dissemination of standards for diagnostic radiology, the development of a charter and the establishment of criteria for active membership of the network. Another major activity is quality audit of radiotherapy centres, involving promotion of national networks; there has been a substantial increase in the number of beams checked owing to the automation of thermoluminescent dosimetry procedures.

In the **environmental area, air pollution** — a serious problem in many parts of the world and particularly in developing countries — has been extensively tackled. It has been demonstrated that (i) nuclear analytical techniques are highly appropriate for determining the elemental composition of airborne particulate matter collected on filters and appropriately selected biomonitors, and (ii) chemometric evaluation of the multi-element data sets produced by these techniques enables identification of pollutant sources and their apportionment.

The TC programme for 1998 included 175 projects related to human health, of which one was interregional and 25 were regional. Disbursements for these projects amounted to US $13.5 million or 21% of total TC expenditures. More than two thirds of these projects dealt with nuclear medicine, and applied radiation biology and radiotherapy.

A very traditional and important area of activity has been the use of isotope and radiation techniques for various **industrial applications.** These include, in particular, non-destructive testing, radiation processing of industrial and medical products, treatment of wastewater and flue gases, and application of tracer techniques for the assessment, development and management of water resources. Assistance has also been rendered in utilization of research reactors and particle accelerators for research and production of radioisotopes for industrial, medical and other applications; monitoring and study of the marine environment; nuclear instrumentation; and radiochemical applications.

Another important activity has been the application of isotopes in **hydrology** which has significantly improved groundwater resource management and pollution prevention in many countries. Dam sustainability has also been improved by isotope techniques in several countries, bringing large economic benefits in the past five years. Radiation technology has proven to be efficient for cleaning flue gas from coal burning electric power stations; the IAEA has assisted four Member States with this technology.

In 1998, assistance to developing Member States in these areas was provided under 236 projects running to US $14 million, which represents 22% of the total disbursements under the TC programme.

B. Safety Pillar

Over the past five years, the IAEA has continued its activities to strengthen the global regime for nuclear, radiation, waste, and transport safety. The regime comprises three main components: legally binding agreements between States, internationally recognized safety standards, and measures to assist States in the implementation of these conventions and standards. In addition, technological solutions for improving safety are being promoted. In 1999, the IAEA also focused on assisting Member States to manage the Y2K readiness problem.

Since 1995 several safety related instruments have been concluded under the IAEA auspices, namely, the Convention on Nuclear Safety which entered into force in 1996; and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage and the Convention on Supplementary Compensation for Nuclear Damage which have yet to enter into force. Four other instruments which were negotiated under the IAEA auspices had already entered into force during the period before 1995, namely, the Convention on Early Notification of a Nuclear Accident (1986), the Convention on the Physical Protection of Nuclear Material (1987), the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1987) and, in the field of nuclear liability, the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (1992).

By its Statute, the IAEA is authorized to establish safety standards and provide for their application. Over the years, the IAEA, in co-operation with its Member States, has developed and issued more than 200 standards which represent international consensus on safety requirements and provide essential guidance for national authorities. They cover all areas where nuclear energy and radiation are used, including nuclear power and its fuel cycle, and various applications in research, medicine, industry, agriculture and other non-power sectors. Since 1996, a programme of work has been under way to revise and update some 70 safety standards. While the first portion of the revised documents has already been published, the majority of the revisions should be completed in 2000-2001 as a result of which a comprehensive and scientifically up-to-date corpus of standards will be available to Member States.

The key to an effective safety regime is the full application of conventions and standards at the workplace. Responsibility for the implementation of the conventions and the application of safety standards rests primarily with Member States. The IAEA, however, undertakes many

activities to assist countries in this endeavour. Throughout the past five years, the IAEA expanded the range of services it can offer in this area and is in the process of upgrading its services to include various types of safety review missions, training, the fostering of scientific research, technical co-operation, legislative assistance, and information exchange. In the past years, the number of Member States using the different safety services of the IAEA in such areas as operational and engineering safety of power and research reactors or the services to review regulatory approaches in nuclear, radiation and waste safety has considerably increased.

In recent years, a substantial number of safety related TC activities have been implemented under a TC Model Project on upgrading radiation and waste safety infrastructure, which is based on achieving the standards required by the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS). The project is designed to establish and strengthen the national safety infrastructure of States using radiation sources and radioactive materials for medical, industrial and research purposes. Particular emphasis has been placed on the basic infrastructure elements, such as establishing legal frameworks for safety, creating and strengthening national regulatory bodies, providing initial education and training for safety professionals, and setting up national systems for the notification and control of radiation sources. As of the end of 1999, about 80% of the 52 States participating in the Model Project had legislation, regulations for regulatory authority and a system of notification, authorization and control of radiation sources approved or in the process of approval.

Under this Model Project, a variety of expert missions were undertaken according to action plans agreed on with the participating countries. Between 1995 and 1999, the IAEA conducted 302 expert missions and held 37 workshops and seminars covering most of the project activities.

In addition to this, the IAEA has continued its educational and training activities under the TC programme as an efficient mechanism for strengthening nuclear and radiation safety. Under the overall safety programme, about 170 national, regional and interregional training events were conducted between 1995 and 1999. Basic professional and postgraduate training courses in radiation protection and nuclear safety are still regularly held in various regions.

The safety related TC activities between 1995 and 1999 involved approximately US $72 million which represents about 25% of total TC disbursements in that period, with over 400 national, regional and interregional projects.

In recent years, an extrabudgetary project has been conducted under the regular programme on the main safety issues related to the design and operation of early generation NPPs in Eastern and Central Europe and the NIS. Its findings and recommendations have been used as technical bases for safety upgrading work at the plants in question, for review by national regulatory authorities and for the establishment of safety priorities in national, bilateral and other international programmes. As a result, considerable progress in nuclear safety has been achieved in the operation of WWER and RBMK reactors in Central and Eastern Europe, in strengthening the independence and technical competence of the nuclear regulatory authorities and in establishing a legislative and regulatory framework for national nuclear regulation. Notwithstanding the results accomplished, more remains to be done. For instance, further efforts are required to maintain and

enhance an effective safety culture and to improve design safety through specific safety analysis reports.

A regional extrabudgetary activity on the safety of nuclear installations in South East Asia, Pacific and Far East countries started in early 1998 under the regular programme. The objective of the activity is to strengthen nuclear safety in participating countries and, in particular, to enhance the capabilities of regulatory authorities and technical support organizations.

Significant inputs for the further development and promotion of nuclear and radiation safety are made through a wide spectrum of meetings ranging from international conferences and symposia attended by hundreds of participants to meetings of several experts or consultants. For example, the following conferences organized by the IAEA in 1998 are worth mentioning: The International Conference on Topical Issues in Nuclear, Radiation and Radioactive Waste Safety and the International Conference on the Safety of Radiation Sources and the Security of Radioactive Materials.

In the past five years, an area of continued concern in the debate over the use of nuclear technologies has been the safety of spent fuel and radioactive waste management. The concerns are associated with the wastes generated by nuclear power plants and the wastes from nuclear applications in medicine, agriculture and industry, but also with the considerable potential increase in the volume of the wastes from the envisaged decommissioning of a number of nuclear power and research reactors. Hence, there is an urgent need to develop and implement disposal plans. The IAEA has assisted Member States in this area, particularly through the development of consensus on safety standards. In some areas, such as the near surface disposal of low level waste, this consensus exists, but in others — for example, geological disposal of high level waste — it has been more elusive.

Over the past few years, a particularly urgent issue has been the threat to public health arising from 'orphan' radioactive sources. The IAEA has provided assistance to check the radiological impacts of these sources that are not under the control of national authorities and helped the national authorities to take the necessary protective measures, including emergency humanitarian assistance. The IAEA is now engaged in the implementation of a plan on the safety of radiation sources and the security of material, including the development of a possible best code of conduct for use by national authorities in this area.

Another area of growing concern has been the safety of research reactors: of the more than 600 research reactors which have been built, 344 have been shut down but only 106 have been decommissioned. Many States operating research reactors still have inadequate regulatory infrastructures, and there are also other serious issues such as ageing, obsolete equipment, lack of spare parts and budgetary constraints. The IAEA's activities in this area have focused on upgrading the regulatory structure and on safety review services. More needs to be done. In the future, additional IAEA efforts are envisaged to enhance operational safety through the completion of a safety requirements document for research reactors; the increased use of advisory missions; the development of guidelines for peer reviews and self assessments; and the provision of assistance in enhancing the safety of ageing research reactors and associated spent fuel stores. Assistance will also be provided in the decommissioning of shutdown reactors.

In recent years, taking a new direction in its safety related services, the IAEA has carried out a number of radiological assessments of areas with radioactive residues from accidents and from past practices such as nuclear weapon testing and radioactive waste disposal. Such areas include some parts of the Kara and Barents Seas, the former nuclear test site near the city of Semipalatinsk (Kazakhstan), Bikini Atoll (Marshall Islands), and Mururoa and Fangataufa Atolls (France). The reports on these assessments have been published by the IAEA.

Another important issue over the past five years has been the safety of transport of radioactive materials. In an effort to assist its Member States to apply the IAEA's Transport Regulations more effectively and universally, the IAEA established a Transport Safety Appraisal Service (TranSAS) and provided training on the safe transport of radioactive materials. The IAEA also invited WHO, the European Commission, the Nuclear Energy Agency of the OECD, the International Air Transport Organization, and the International Federation of Airline Pilots Associations to work closely with it on matters relating to the safe transport of radioactive materials.

The IAEA continues to encourage research and development by supporting research contracts and agreements on a wide range of safety related subjects. At the beginning of 1998, there were almost 300 such contracts and agreements active on particular aspects of nuclear, radiation and radioactive waste safety.

Table 1 shows Regular Budget and extrabudgetary resources by major area of activity in 1999.

Area of Activity	Resources (US $ millions)		%
	Regular Budget	Extra-budgetary	
Nuclear Verification and Security of Material	80.0	11.2	38.3
Policy-making, Co-ordination and Support	66.3	2.7	29.0
Non-power Nuclear Applications	31.6	3.5	14.7
Nuclear, Radioactive and Waste Safety	14.0	3.0	7.1
Nuclear Power, Fuel Cycle & Waste Management	12.5	0.9	5.6
Management of Technical Co-operation	12.5	0.2	5.3
TOTAL	**216.9**	**21.5**	
GRAND TOTAL	**238.4**		**100**

Table 1. Regular Budget plus extrabudgetary resources (excluding TC) by major area of activity 1999.

V. CHALLENGES TO PEACEFUL CO-OPERATION

A. Changing times and new opportunities

In the past decade, political, economic, and technological developments have been major influences on the IAEA's work. They have presented new challenges and opportunities, requiring that the IAEA's plans and priorities be adjusted to changing realities.

Among the trends, challenges and opportunities that will influence the IAEA's course over the next five years are the following:

- The use of nuclear applications in developing countries is growing as local infrastructures improve and technology transfer increases.
- As the demand for electricity continues to increase and the drive for sustainable development gains momentum, the need to exploit energy sources with limited environmental impacts (in particular to meet commitments made in connection with the Kyoto Protocol) could revitalize the nuclear power option.
- In the context of global economic liberalization, leading to utility privatization, deregulation and diminishing State support for the nuclear power industry, there is a need to ensure that nuclear safety will not be compromised.
- As a result of the end of the Cold War, large amounts of nuclear material from the military sector became available to the civil sector, where large amounts of plutonium have already accumulated, with the attendant need for safety, security and safeguards. In addition, there is the prospect of a global ban on the production of fissile material for explosive purposes, which could entail major expansion of the IAEA's verification activities.
- As NPPs age and spent fuel and waste accumulate, more must be done to implement existing technical solutions for the management of spent fuel, for the disposal of radioactive waste and, where appropriate, for plant decommissioning and life optimization.
- Greater emphasis is being placed on the need for more effective verification of non-proliferation undertakings through strengthened safeguards covering both declared and undeclared nuclear material and activities.
- Civil society is acquiring an increasing role in shaping national and international policy, with the attendant need for enhanced and more open communication between the IAEA and the general public.
- Rapid and extensive advances in information technology will offer exceptional opportunities for new ways of working. In addition, new information technology will make better communication and outreach possible.

B. Goals and objectives 2001—2005

In 1999, against the background of these trends, challenges and opportunities, the IAEA adopted a **Medium Term Strategy** which establishes its goals and specific objectives for the five year period from 2001 to 2005 and specifies the means proposed to meet these objectives.

The objectives set by the IAEA for the medium term are grouped under three substantive goals or pillars that will continue to form a valid basis for its work, and two complementary functional goals to ensure efficient achievement of the substantive goals. The order in which the substantive goals are presented below does not imply any judgement as to their relative importance. They are complementary and interrelated.

In this approach, the first pillar discussed - technology - is broadly related to sustainable development and the transfer of technology, in particular through the TC programme.

1. Substantive goals

   A. Enhancement of the contribution of nuclear technologies towards meeting, in a sustainable manner, the needs and interests of Member States;

   B. A comprehensive and effective worldwide nuclear safety culture;

   C. Assurances to the international community of the peaceful use of nuclear material.

2. Functional goals

   A. Effective interaction with partners and the public;

   B. Excellence in management.

Since substantive goals A and B are directed at the implementation of the IAEA's promotional functions, which are relevant to the NPT Article IV, they are outlined below.

GOAL A: ENHANCEMENT OF THE CONTRIBUTION OF NUCLEAR TECHNOLOGIES TOWARDS MEETING, IN A SUSTAINABLE MANNER, THE NEEDS AND INTERESTS OF MEMBER STATES

The Member States have different interests in, needs for and attitudes towards the use of nuclear technologies, which themselves change over time. In addition, developments in other technical fields have had an impact - both positive and negative - on the comparative advantages of nuclear technologies.

The threefold challenge for the IAEA in the medium term is:

- to understand how the needs and interests of Member States are changing so as to be able to respond by focusing on the appropriate nuclear technologies;
- to contribute to the objective assessment of the use of nuclear technologies and to assist Member States in the safe application of those technologies that continue to have a comparative advantage;
- to play a catalytic role in the international effort to maintain and increase knowledge, understanding and expertise in the nuclear field, particularly through the collection and dissemination of scientific information and the transfer of technology.

Objective A.1: To identify and assess nuclear technologies which could be used to meet the needs and development goals of Member States.

Objective A.2: To achieve a more effective use of current applications of nuclear technologies in power and non-power fields.

Objective A.3: To support and facilitate the development of new and emerging applications of nuclear technologies in nuclear power and its fuel cycle, and in non-power areas.

Priorities in Goal A: The Statute considers Goal A to be a central part of the IAEA's work inasmuch as it has an impact on the economic and social development of Member States. Priorities

under Goal A, however, continue to evolve because of changes in development aims and the comparative advantage of nuclear vis-à-vis other technologies. With regard to non-power applications, the priorities will be attached — in line with different recommendations from programme appraisals — to increasing food production, fighting disease, managing water resources and monitoring and protecting the environment. With regard to nuclear power, first priority will be given to the back end of the nuclear fuel cycle, in particular to technological solutions to waste management problems and building international consensus on disposal of high level and long lived radioactive waste. Second priority will be given to small and medium size reactors and other innovative technologies, and third priority will be given to the potential role of nuclear energy in sustainable development. Needs and interests of Member States will be regularly evaluated in order to confirm these objectives and priorities.

GOAL B: A COMPREHENSIVE AND EFFECTIVE WORLDWIDE NUCLEAR SAFETY CULTURE

It is widely recognized today that a demonstrated high standard of nuclear, radiation and radioactive waste safety will be a determining factor for the future use of nuclear technology and that safety relies not only on good technology but, equally, on good regulatory practices and well qualified personnel. The achievement of a worldwide safety culture will be aided by the existence of effective international instruments prescribing the basic legal norms for the safe use of nuclear technology, internationally accepted standards, and assistance to States in their implementation.

The challenges to the goal of a comprehensive safety culture are:

- areas where adequate international regulation is lacking;
- IAEA standards that are not always up-to-date and areas where standards have not yet been formulated (e.g. the long term safety of radioactive waste repositories);
- inadequate implementation of standards (e.g. reactors built to earlier designs often do not meet the safety levels reflected in present-day standards);
- absence of universal acceptance of the safety review services developed by the IAEA.

Transparency and openness are important characteristics of the envisaged safety culture. For the IAEA, this implies supporting such openness in Member States and taking on a more active role in helping to raise awareness of safety issues.

Objective B.1: To strengthen and promote a system of international legally binding instruments and other formal commitments.

Objective B.2: To complete the development and update of standards in all areas of nuclear, radiation, transport and waste safety.

Objective B.3: To achieve more effective application of safety standards in Member States.

Objective B.4: To promote technological solutions for improving the safety of nuclear installations and of treatment, storage and disposal of high, intermediate and low level wastes and spent fuel.

Priorities in Goal B: The IAEA's objectives concerning safety related international instruments and safety standards will have high priority. The need for new international safety

related instruments will also be continuously assessed. In developing new safety standards, high priority is assigned to consensus building on criteria for the safety of repositories of high level/long lived waste. The current revision of the existing safety standards will be completed early in the medium term. This will pave the way for giving increased priority to application of these standards through the promotion of education and training programmes, the provision of advisory and review services and technical co-operation. Also, the IAEA will take steps to gain more universal acceptance of its safety services and ensure proper co-ordination of efforts in the safety field with relevant organizations. In this manner, the IAEA will effectively contribute to an international safety culture.

VI. CONCLUSION

The IAEA's activities related to Article IV of the NPT are many, diverse in scope but focused on priority needs of its Member States. These activities continue to enjoy interest and support from both donors and recipient countries although, due to its voluntary nature, the level of funding for these activities continues to be unpredictable.

Since the last NPT Review and Extension Conference in 1995, the IAEA has continued its efforts aimed at strengthening its role in the transfer of peaceful nuclear technologies to its developing Member States. A new TC strategy has been adopted and is now actively used in TC programming and implementation. Technical Departments have intensified activities in priority areas related to the transfer of nuclear technology to developing countries, especially in areas such as water resource management, environmental monitoring, radiation safety, and radioactive waste management.

Further improvement of the efficiency and effectiveness of the technology transfer activities is foreseen as a priority goal under the IAEA Medium Term Strategy covering the first five years of the 21st century. This will enhance the contribution of nuclear technologies towards meeting the needs and interests of a growing number of Member States.

As a result, the IAEA is expected to expand its role as the principal vehicle of multilateral co-operation in the peaceful use of nuclear energy.

ABBREVIATIONS

AFRA	African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology
APC	Assessed Programme Costs
ARCAL	Regional Co-operative Arrangements for the Promotion of Nuclear Science and Technology in Latin America
BSS	International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources
CPF	Country programme framework
CRP	Co-ordinated research project
FAO	Food and Agricultural Organization
IAEA	International Atomic Energy Agency
ICTP	International Centre for Theoretical Physics (Trieste, Italy)
INIS	International Nuclear Information System
NIS	Newly Independent States (of the former USSR)
NPP	Nuclear Power Plant
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
OECD	Organisation for Economic Co-operation and Development
PRIS	Power Reactor Information System
RBMK	Light water cooled graphite moderated reactor (Soviet design)
RCA	Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (for Asia and the Pacific)
RSA	Revised Supplementary Agreement concerning the provision of technical assistance
SIT	Sterile insect technique
TC	Technical Co-operation
TCDC	Technical Co-operation among Developing Countries
TCF	Technical Co-operation Fund
TranSAS	Transport Safety Appraisal Service
WANO	World Association of Nuclear Operators
WHO	World Health Organization
WWER	Water cooled water moderated energy reactor (Soviet design)

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ACTIVITIES OF THE INTERNATIONAL ATOMIC ENERGY AGENCY RELEVANT TO ARTICLE V OF THE TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS

Background Paper Prepared by the Secretariat of the IAEA

February 2000

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Article V of the NPT

1. "Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a non-discriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements."

ACTIVITIES OF THE INTERNATIONAL ATOMIC ENERGY AGENCY RELEVANT TO ARTICLE V OF THE TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS

I. History of IAEA Activities

2. The IAEA activities relevant to Article V of the Treaty on the Non-Proliferation of Nuclear Weapons in relation to nuclear explosions for peaceful purposes (PNEs) began in the late sixties on recommendations of the 1968 UN Conference of Non-Nuclear Weapon States (CNNWs)[1] and the decision of the IAEA General Conference in 1968[2]. The United Nations General Assembly subsequently in the same year asked the Secretary General for a report on the establishment within the framework of the IAEA of an international service for nuclear explosions for peaceful purposes under appropriate international control. The Agency convened a series of international technical panels between 1970 and 1976 for the review and dissemination of scientific and technical information on the subject and continued to monitor the literature on PNEs and information on this topic under the International Nuclear Information System (INIS). A glossary of relevant technical terms in four languages (English, French, Russian and Spanish) was completed and published in 1980.[3] A bibliography of literature related to PNEs was first published in 1967[4] and later revised and published in 1980[5].

3. The activities performed by the Agency in this context during the period 1969 to February 1976 were reported to the First Review Conference of Parties to the Treaty on the Non-Proliferation of Nuclear Weapons in document, NPT/CONF/12 and Add.1. Over the succeeding years the Agency has submitted to the NPT Review Conferences reports on its activities in the field of PNEs. These reports may be found in documents: NPT/CONF.II/8 (1980), NPT/CONF.III/11 (1985), NPT/CONF.IV/14 (1990) and NPT/CONF.1995/9.

4. In the Final Declaration of the First Review Conference in 1975,[6] the parties to the NPT recognized the IAEA's responsibility and technical competence in connection with PNEs. The Conference considered the IAEA to be the appropriate international body, referred to in Article V of the Treaty, through which potential benefits from PNEs could be made available to any non-nuclear weapon state. Commending the IAEA for its work in this field, the Conference emphasized the Agency's central role in matters relating to the provision of services for PNEs.

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[1] United Nations document A/7277, resolutions H. IV and H. I.

[2] General Conference resolution GC (XII)/RES/245.

[3] IAEA-TECDOC-226

[4] Bibliographical series, STI/PUB/21/38

[5] Bibliographical series, STI/PUB/21/43

[6] NPT/CONF/35/I

5. In 1975 the Board of Governors of the Agency set up an Ad Hoc Advisory Group on PNEs, which had meetings between September 1975 and August 1977. The Advisory Group was tasked to advise the Board, within the Agency's sphere of competence, on the structure and content of the agreement or agreements necessary under Article V of the NPT. The final report of the Advisory Group (IAEA document GOV/1854, which was annexed to NPT/CONF/II/8) was submitted to the Board of Governors. The report listed principles to be considered in formulating international arrangements for providing PNEs in accordance with the NPT. It also provided proposals for a possible structure of such agreement(s). In response to this report, the Board resolved:[7]

- to keep the subject matter of the report under review and to continue consideration of the matter when appropriate;
- that the services of the Ad Hoc Advisory Group should continue to be available as required;
- to request the Director General to distribute the report to IAEA Member States and to the Secretary-General of the United Nations for the information of its Member States, and to keep the Member States and the Board informed of any developments concerning the subject matter of the report.

The Advisory Group has not met since 1977.

6. In 1976 an IAEA fact finding mission was undertaken to the Qattara Depression in Egypt on invitation of the Egyptian Ministry of Electricity and Energy. The mission did not lead to a request for specific PNE related services. No other requests for PNE-related services or information have been received by the IAEA. Nor has the Agency been informed of any request for PNE related services directed to those states parties to the NPT which possessed nuclear explosive devices.

7. The Third Review Conference of the Parties to the NPT confirmed in 1985 the Agency's role under Article V, but also noted that the potential benefits of the peaceful applications of nuclear explosions had not yet been demonstrated. Although agreement was not reached on a Final Document for the Fourth Review Conference in 1990, the States Parties, in their consideration of Article V of the NPT, once again expressed the view that, if the potential for safe and peaceful applications of nuclear explosions were demonstrated, which it had not been, the IAEA would be the appropriate body through which any such applications would be made available to non-nuclear-weapon States.

The draft report of Main Committee III of the Review and Extension Conference of the NPT in 1995 stated, *inter alia*, concerning Article V:

> "2. The Conference records that the potential benefits of the peaceful applications of nuclear explosions envisaged in article V of the Treaty have not materialized. In this context, the Conference notes that the potential benefits of the peaceful applications of nuclear explosions have not been demonstrated and that serious

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[7] IAEA document GOV/DEC/94(XX)/Rev.1, decision (50), (51).

concerns have been expressed as to the environmental consequences that could result from the release of radioactivity from such applications and on the risk of possible proliferation of nuclear weapons. Furthermore, no requests for services related to the peaceful applications off nuclear explosions have been received by IAEA since the Treaty entered into force. The Conference further notes that no State party has an active programme for the peaceful application of nuclear explosions.

3. The Conference therefore recommends that the Conference on Disarmament take this situation and future developments into account when negotiating a comprehensive nuclear test-ban treaty."

II. Comprehensive Nuclear Test Ban Treaty

8. The Comprehensive Nuclear-Test-Ban Treaty (CTBT) was opened for signature on 24 September 1996. As of 13 October 1999, 153 States have signed the CTBT and instruments of ratification have been deposited by 51 States. Under Article I of the Comprehensive Nuclear-Test-Ban Treaty:

"1. Each State party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control.

2. Each State party undertakes, furthermore, to refrain from causing, encouraging, or in any way participating in the carrying out of any nuclear weapon test explosion or any other nuclear explosion."

Peaceful nuclear explosions are thus prohibited by the CTBT.

9. At the Conference on Facilitating the Entry into Force of the Comprehensive Nuclear-Test-Ban Treaty held in Vienna in October 1999 the signatories and the ratifiers of the CTBT unanimously reaffirmed in the Final Declaration "their commitment to the Treaty's basic obligations and their undertaking to refrain from acts which would defeat the object and purpose of the Treaty pending its entry into force."

III. IAEA Activities since 1995

10. Apart from the addition of a few entries related to PNEs conducted in the past to the INIS (International Nuclear Information System) database, the IAEA has not been engaged in activities related to nuclear explosions for peaceful purposes during 1995-1999.